QUEEN'S UNIVERSITY

KINGSTON, CANADA

INCORPORATED BY ROYAL CHARTER IN 1841

CALENDAR

OF

THE FACULTY OF APPLIED SCIENCE

FIFTY-FIFTH SESSION

1947-48

This Calendar is published five months before the opening of the session. Staff, courses, and regulations will probably be as announced, but the University reserves the right to make changes.

Special attention is directed to the following:

Students entering the first year of the Faculty of Applied Science should note that registration takes place on Tuesday, September 16th, and lectures begin on Wednesday, September 17th. The purpose of this early registration is to give first year students an opportunity to orient themselves to University life.

QUEEN'S UNIVERSITY

KINGSTON, CANADA

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CALENDAR

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PRINTED FOR THE UNIVERSITY BY
HANSON & EDGAR
KINGSTON
1947

CALENDAR

1947

JANUARY

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JANUARY

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NOVEMBER

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DECEMBER

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ACADEMIC YEAR

1947

May 1—Written notice due at the Registrar's Office of candidates' intention to compete for Provincial Scholarships and Ontario Matriculation Scholarships.

July 15—Last day for applying for September examinations, or for degrees. Students applying after this date will be required to pay a late fee of $3.

Aug. 26—Shop Work for Third and Fourth Year Courses F and G begins.

Aug. 27—Arts Supplemental Examinations begin.

Sept. 1—Last day for receiving applications for the Robert Bruce Bursaries.

Sept. 3, 4, 5, 6—Supplemental Examinations in Applied Science.

Sept. 8—Surveying Field Class opens.

Sept. 16—Registration of First Year Students.

Sept. 17—Classes of First Year open at 8 a.m.

Sept. 23—Registration of Second, Third and Fourth Year Students.

Sept. 24—Classes of Second, Third and Fourth Years open at 8 a.m.

Sept. 27—Last day of registration (with extra fee) of students in First Year who have not previously obtained permission to register later.

Oct. 4—Last day of registration (with extra fee) of students in Second, Third, and Fourth Years who have not previously obtained permission to register later.

Oct. 16—University Day.

Dates of the Christmas examinations to be announced.

Dec. 20—Christmas holidays begin at noon.

1948

Jan. 2—Examinations in half courses of the first term begin at 2 p.m.

Jan. 5—Classes of the second term begin at 8 a.m. for First and Second Years. Last day for payment of second instalment of fees without penalty for First and Second Years.

Jan. 6—Classes of the second term begin at 8 a.m. for Third and Fourth Years. Last day for payment of second instalment of fees without penalty for students in Third and Fourth Years.

Feb. 13-14—Mid-term holiday.

Mar. 15—Last day for receiving applications for graduation.

Mar. 26—Good Friday.

Apr. 1—Last day for receiving manuscripts and essays for prizes.

Apr. 3—Classes close at noon.

May 15—Convocation for distributing prizes, announcing honours, and conferring degrees. (This date is provisional.)

DATES FOR THE SPECIAL SUMMER SESSION

1947

Apr. 7—Registration of Second and Third Year Students.

Apr. 8—Classes open at 8 a.m.

June 28—First term ends.

July 3—Second term begins.

Sept. 20—Second term ends for Second Year.

Sept. 27—Second term ends for Third Year.

The return of servicemen and women to civilian life greatly increased the number of students applying for admission to Canadian universities. To meet this emergency, Queen's University established special summer sessions. During the summer of 1945, courses were offered in first year Applied Science and, in addition, veterans were permitted to take a preparatory programme for Engineering. Forty-four students registered in Applied Science, and twenty-nine took advantage of the preparatory courses. During the winter of 1945-46, four hundred and forty-five veterans registered in the Faculty of Applied Science. In the summer of 1946, the University offered the preparatory year, and the first and second years in Applied Science. There were sixty students in the preparatory year, two hundred and ninety-seven in first year Engineering, and two hundred and twenty-five in second year. During the winter of 1946-47, eight hundred and eleven veterans registered in this Faculty. In the summer of 1947, the work of the second and third years is being given.

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(Founded 1893)

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(Founded 1841)

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SECRETARY—Jean I. Royce, B.A.

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(Founded 1854)

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B. K. SANDWELL, B.A., LL.D., D.C.L., F.R.S.C. ..... Rector

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Retire 1949

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J. G. Dwyer, M.A., M.D.,C.M., LL.D.[6] ..... New York, N.Y.
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T. A. McGinnis, B.Sc.[2] ..... Kingston, Ont.
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A. E. MacRae, B.Sc.[7] ..... Ottawa, Ont.
R. M. Smith, B.Sc., LL.D.[6] ..... Toronto, Ont.
J. B. Stirling, B.A., B.Sc.[4] ..... Montreal, P.Q.

Retire 1950

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J. A. Edmison, B.A., K.C.[3] ..... Toronto, Ont.
J. M. Farrell, B.A., LL.D., K.C.[6] ..... Kingston, Ont.
D. A. Gillies, B.A.[7] ..... Arnprior, Ont.
J. E. McAskill, M.D.,C.M.[1] ..... Watertown, N.Y.
J. M. Macdonnell, M.C., M.A., LL.D., K.C., M.P.[2] ..... Toronto, Ont.
A. G. MacLachlan, B.Sc.[1] ..... Kingston, Ont.
W. E. McNeill, M.A., Ph.D., D.C.L., LL.D., F.R.S.C.[6] ..... Kingston, Ont.
W. A. Newman, B.Sc.[4] ..... Montreal, Que.
Mrs. James Richardson[3] ..... Winnipeg, Man.

Retire 1951

Elmer Davis, Esq.[6] ..... Kingston, Ont.
A. J. Meiklejohn, B.A.[6] ..... Kingston, Ont.
D. K. MacTavish, B.A., K.C.[2] ..... Ottawa, Ont.

---

[1]Elected by the University Council for three years.
[2]Elected by the Benefactors for four years.
[3]Elected by the Graduates for three years.
[4]Elected by the Board of Trustees to represent the Faculty of Applied Science for three years.
[5]Appointed by the Governing Board of Queen's Theological College for one year.
[6]Elected by the Board of Trustees for four years.
[7]Elected by Benefactors to represent the Faculty of Applied Science for three years.

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Retire 1949

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Retire 1950

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Retire 1951

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C. D. Wight, B.Sc. ..... Ottawa, Ont.

Retire 1952

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J. W. Ambrose, A.B. (Stanford), Ph.D. (Yale), F.R.S.C., F.G.S.A.,
Special Lecturer in Geology, 427 Earl Street.

C. V. Armour, M.A.Sc. (Toronto), On leave of absence—
Associate Professor of Civil Engineering, Session 1946-47.

L. G. Berry, M.A., Ph.D. (Toronto), F.G.S.A., F.M.S.A.,
Assistant Professor of Mineralogy, 293 College Street.

J. R. Bristow, B.Sc., Ph.D. (Bristol), F. Inst. P.,
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The Miller Memorial Research Professor of Geology, and Head of the Department, 140 Beverly Street.

J. C. Cameron, M.Com. (Queen's),
Professor of Commerce and Head of the Department of Industrial Relations, 38 Kensington Avenue.

W. M. Campbell, B.A.Sc. (Toronto), M.S. (Case),
Assistant Professor of Chemical Engineering, 29 Nelson Street.

O. A. Carson, B.Sc. (Queen's), A.M., Ph.D. (Columbia),
Associate Professor of Metallurgy, 72 Barrie Street.

H. M. Cave, M.A. (Queen's), Ph.D. (Cantab.),
Associate Professor of Physics, 133 King Street East.

H. G. Conn, O.B.E., B.Sc. (Queen's), M.S. (Michigan),
Professor of Mechanical Engineering and Head of the Department, 288 Victoria Street.

B. B. Denyes, B.Sc. (Queen's),
Special Lecturer in Mechanical Engineering, 12 Main Street.

R. L. Dorrance, M.A. (Toronto), F.C.I.C.,
Associate Professor of Chemistry, 81 Lower Union Street.

G. L. Edgett, M.A. (Mt. Allison), Ph.D. (Ill.),
Associate Professor of Mathematics, 41 Traymoor Avenue.

H. M. Edwards, B.Sc. (Queen's),
Lecturer in Civil Engineering, La Salle Barracks.

J. F. Edwards, B.A. (Queen's),
Instructor in Physical Training, 74 Barrie Street.

D. S. Ellis, D.S.O., B.Sc., M.A. (Queen's), M.C.E., (Cornell),
Dean of the Faculty of Applied Science, Professor of Civil Engineering, and Head of the Department, 418 Earl Street.

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Professor of Physics, 68 Collingwood Street.

G. B. Frost, B.A. (Toronto), Ph.D. (Calif.),
Professor of Chemistry, Annandale Apartments.

W. D. Gilbert, B.Sc. (Queen's), S.M. (M.I.T.),
Lecturer in Mechanical Engineering, Gananoque, Ontario.

S. M. Gilmour, B.D., Ph.D. (Chicago),
Lecturer in Scientific German, 21 Beverly Street.

S. N. Graham, B.Sc. (Queen's),
Professor of Mining Engineering and Head of the Department, 11 Kensington Avenue.

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Associate Professor of Mathematics, On leave of absence.

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R. L. Jeffery, B.A. (Acadia), M.A., Ph.D., (Cornell), F.R.S.C.,
The N. F. Dupuis Professor of Mathematics and Head of the Department, 42 Napier Street.

D. M. Jemmett, D.C.M., B.Sc., M.A. (Queen's),
Professor of Electrical Engineering and Head of the Department, "Elmhurst," Centre Street.

M. L. Keith, B.Sc. (Alberta), M.Sc. (Queen's), Ph.D. (M.I.T.), F.G.S.A.,
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R. J. Kennedy, B.Sc. (Queen's),
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Associate Professor of Civil Engineering, Bath Road P.O

J. D. Lee, B.Sc. (Queen's), M.Sc. (Iowa),
Associate Professor of Civil Engineering, Bath Road P.O.

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N. Mendelsohn, M.A., Ph.D. (Toronto),
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Norman Miller, M.A. (Queen's), Ph.D. (Harvard),
Professor of Mathematics and Chairman of the Extramural and Tutorial Work in Mathematics, 28 Kensington Avenue.

L. A. Munro, M.A. (Dal.), Ph.D. (McGill), F.C.I.C.,
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Assistant Professor of Chemistry, 99 Dundas Street.

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Instructor in English, 245 Alfred Street.

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A. C. Plewes, M.Sc. (Queen's), Ph.D. (McGill),
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Instructor in Mathematics, Bath, Ontario.

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W. G. Stinson, B.Sc. (Queen's),
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D. C. Stirling, B.Sc. (Queen's),
Instructor in Mathematics, 139 Union Street.

H. J. Styles, B.Sc. (Queen's),
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E. G. Taylor, B.Sc., Sc.M., Ph.D. (Wales), A.R.I.C.,
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G. D. White, B.Sc. (Queen's),
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F. M. Wood, M.A., B.Sc. (Queen's),
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ASSISTANTS AND DEMONSTRATORS

Chemical Engineering: L. R. Klinck, B.Sc. (Queen's), A. G. Moreton, B.Sc. (Queen's).

Chemistry: W. K. Buchanan, B.A. (Toronto), A. G. W. Lamont, B.A.Sc, (Toronto), F. W. Southam, B.Sc. (Queen's).

Civil Engineering: Ian MacLachlan, B.Sc. (Queen's), J. H. O'Dette, M.Sc. (Queen's), D. L. Seymour, B.Sc. (Queen's).

Drafting: L. H. Shibley, B.Sc. (Queen's).

English: Mrs. F. C. R. Chalke, B.A. (Queen's), Mrs. H. J. Herbst, B.A. (Queen's), Mrs. M. G. Hoffman, G. W. E. McElroy, Mrs. F. Peacock, F. J. Wilson, M.A. (Queen's), Mrs. S. P. Wilson.

Geology: E. E. Campbell, B.Sc. (Queen's), W. F. Dix, B.A. (Toronto), J. Hill, M.A., B.Sc. (Queen's), K. C. Rose, B.Sc. (Queen's), D. H. Yardley, B.Sc. (Queen's).

Mineralogy: J. Earley, B.Sc. (University of Western Ontario), A. R. Graham, B.A., B.Sc. (Queen's), R. A. Hughes, B.Sc. (Queen's).

Physics: J. M. D. Gibson, B.Sc. (Queen's), G. M. Keyser, B.Sc. (Queen's), A. B. Lillie, B.Sc. (Queen's), L. H. Lowther, B.Sc. (Acadia), W. J. Major, B.Sc, (Queen's), R. W. Stewart, B.Sc. (Queen's), G. N. Whyte, B.Sc. (Queen's).

UNDERGRADUATE ASSISTANTS

W. A. Armstrong, G. B. Asselstine, C. R. Baker, J. G. S. Billingsley, W. J. Forsyth, A. D. Kaill, K. B. Knox, L. E. LaChance, H. Messel, A. S. Morse, W. A. Trotter, J. F. Williams.

ADMINISTRATION AND GOVERNMENT

The administration of the University is vested in the Board of Trustees, the University Council, the Senate, and the Faculty Boards.

THE BOARD OF TRUSTEES

The Board of Trustees consists of *ex-officio* and elective members. The former are the Chancellor, the Principal, and the Rector. The latter consist of (1) one representative from each affiliated college, (2) representatives as provided for by the Statutes from (*a*) the University Council, (*b*) the Benefactors, (*c*) the Graduates, and (3) members elected by the Board of Trustees.

The functions of the Board of Trustees are to manage the finances, to possess and care for the property, to procure legislation, to appoint instructors and other officers, and in general to attend to such external matters as do not relate directly to instruction.

THE UNIVERSITY COUNCIL

The University Council consists of the Chancellor, the Trustees, the members of the Senate, and an equal number of members elected by the graduates from their own members.

The Functions of the Council are:

(1) To elect the Chancellor, except when two or more candidates are nominated, in which case the election is by registered graduates.

(2) To elect six trustees, two of whom shall retire annually.

(3) To make by-laws governing the elections of (*a*) the Rector by the registered students, (*b*) seven trustees by the benefactors, (*c*) six trustees by the University Council, and (*d*) six trustees by the graduates.

(4) To discuss all questions relating to the University and its welfare.

(5) To make representation of its views to the Senate or the Board of Trustees.

(6) To decide on proposals for affiliation.

(7) To arrange all matters pertaining to (*a*) its own meetings and business, (*b*) the meetings and proceedings of Convocation, (*c*) the installation of the Chancellor, and (*d*) the fees for membership, registration, and voting.

Ordinarily the annual meeting of the Council is held on the day before the spring Convocation.

THE SENATE

The Senate consists of:

The Principal.
The Vice-Principal.
The Principal of Queen's Theological College.
The Dean of the Faculty of Arts.
The Dean of the Faculty of Applied Science.
The Dean of the Faculty of Medicine.
Three Professors elected by the Faculty of Arts.
Three Professors elected by the Faculty of Medicine.
Three Professors elected by the Faculty of Applied Science.
Two Professors elected by the Faculty of Queen's Theological College.
The Registrar.

The Functions of the Senate are:

(1) To determine all matters of an academic character which concern the University as a whole.

(2) To consider and determine all courses of study leading to a degree, including conditions of Matriculation, on recommendation of the respective Faculty Boards; but the Senate shall not embody any changes without having previously presented these to the Faculty.

(3) To recommend to the Board of Trustees the establishment of any additional Faculty, Department, Chair, or Course of Instruction in the University.

(4) To be the medium of communication between the Alma Mater Society and the Governing Boards.

(5) To determine all regulations regarding the social functions of the students within the University, and regarding the University Library and University Reading Rooms.

(6) To publish the University Calendars.

(7) To conduct examinations.

(8) To grant Degrees.

(9) To award University Scholarships, Medals, and Prizes.

(10) To enforce the Statutes, Rules, and Ordinances of the University.

(11) And generally, to make such recommendations to the Governing Boards as may be deemed expedient for promoting the interests of the University.

THE FACULTY BOARDS

The Faculty Boards are constituted as follows:

For the Faculty of Arts and for the Faculty of Applied Science, the Dean, Professors, Associate Professors, Assistant Professors, and Lecturers of each Faculty have power to meet as separate boards, and to administer the affairs of each Faculty under such regulations as the Board of Trustees may prescribe.

For the Faculty of Medicine, the Dean, Professors, Associate Professors, and Assistant Professors have power to meet as a separate board, and to administer the affairs of the Faculty under such regulations as the Board of Trustees may prescribe.

The Principal and Vice-Principal are *ex-officio* members of each of the Faculty Boards.

The Functions of the Faculty Boards are:

(1) To recommend to the Senate courses of study leading to a degree, and the conditions of admission.

(2) To decide upon applications for admission or for change of course, subject to the regulations of the Senate.

(3) To submit to the Senate names for both ordinary and honorary degrees.

(4) To arrange the time-table for classes and to edit the Faculty Calendar, subject to the approval of the Senate.

(5) To control registration, and to determine the amount of fees and manner of payment, subject to the regulations of the Senate and the approval of the Board of Trustees.

(6) To deal with class failures.

(7) To exercise academic supervision over students.

(8) To make such recommendations to the Senate as may be deemed expedient for promoting the efficiency of the University.

(9) To award Faculty Scholarships, Medals, and Prizes.

(10) To appoint, within the limits of the funds made available by the Trustees, such sessional assistants, fellows, tutors, and demonstrators as shall be needed to give instruction in the subjects taught by the Faculty.

(11) To pass such regulations and by-laws as may be necessary for the exercise of the functions of the Faculty.

DEGREES

By the Royal Charter granted to Queen's College, it is "willed, ordained and granted, that the said College shall be deemed and taken to be an University, and that the students in the said College shall have liberty and faculty of taking the degrees of Bachelor, Master, and Doctor in the several Arts and Faculties".

The degrees at present conferred under the statutes of the University are as follows:

I.—Honorary Degrees

Doctor of Divinity, D.D.; Doctor of Laws, LL.D.

II.—Degrees by Examination

1.—In Arts

Bachelor of Arts, B.A.; Bachelor of Commerce, B.Com.; Master of Arts, M.A.; Master of Commerce, M.Com.; Doctor of Philosophy, Ph.D.
Diploma in Laboratory Technique.

2.—In Theology

Bachelor of Divinity, B.D.

3.—In Medicine

Doctor of Medicine, M.D.; Master of Surgery, C.M.; Diploma of Public Health, D.P.H.; Master of Science, M.Sc. (Med.); Diploma in Medical Radiology.

4.—In Applied Science

Bachelor of Science, B.Sc.; Master of Science, M.Sc.

5.—School of Nursing

Bachelor of Nursing Science, B.N.Sc.

HOODS

Each Degree has its distinctive hood, as follows:

B.A.—Black, bordered with red silk.

B.Com.—Black, bordered with green silk.

M.A.—Black, lined with scarlet silk, bordered with scarlet silk.

M.Com.—Black, lined with green silk, bordered with green silk.

B.D.—White silk, bordered with crimson plush.

M.D. and C.M.—Scarlet silk, bordered with white silk.

M.Sc. (Med.)—Scarlet silk, lined with white silk, bordered with white silk.

B.Sc.—Black, bordered with yellow (old gold) silk.

M.Sc.—Black, lined with yellow silk, bordered with yellow silk.

B.N.Sc.—White silk, bordered with scarlet silk.

D.Sc.—Yellow silk, bordered with black.

D.D.—Purple silk, lined with white silk, bordered with white.

LL.D.—Black silk, lined with blue silk, bordered with blue.

Ph.D.—Black silk, lined with purple, bordered with white.

HISTORICAL NOTES

The School of Mining, now the Faculty of Applied Science, Queen's University, was founded in 1893 under an Ontario Charter which placed its management in the hands of a Board of Governors elected by its shareholders, i.e., the subscribers to its funds. While originally a Mining School it has been expanded to include courses of study for degrees in mining and metallurgy, in civil, mechanical, electrical, and chemical engineering, in analytical chemistry and assaying, in physics, and in geology and mineralogy. The objects of the institution were to provide thorough instruction both theoretical and practical, in the above and other branches of applied science, and to adapt courses of study and methods of presentation to the conditions prevailing in Canada, so as to secure as nearly as may be a maximum usefulness to the country.

For several sessions all its Departments were housed in Carruthers Science Hall, which had been erected in 1889, but in view of the rapid success and increased requirements of the School the Provincial Legislature in 1900 provided for its accommodation two large buildings, Ontario Hall for the Departments of Mineralogy, Geology, and Physics, and Fleming Hall, for the Departments of Civil, Mechanical, and Electrical Engineering. More recently the Provincial Government erected Gordon Hall, which is entirely devoted to Chemistry; and, through the generosity of Professor Nicol and other graduates, Nicol Hall was built for the accommodation of the class rooms and laboratories of the Departments of Mining and Metallurgy. These changes permitted the Civil Engineering Department to move into Carruthers Hall, leaving room in Fleming Hall for the already overcrowded departments of Electrical and Mechanical Engineering. Miller Hall, one of the finest buildings on the campus, was opened in 1931 for the Departments of Mineralogy and Geology, making it possible for the Department of Chemical Engineering to move into Ontario Hall.

From its inception the School of Mining was closely connected with the University. The students of the School of Mining received their degrees from the University and the graduates in Science enjoyed the same rank and privilege as other graduates in representation upon the University Council and in the election of University Trustees. The staff of the School of Mining practically constituted the Science Faculty of the University, some of its members being actively connected also with the Arts and Medical Faculties, and the Faculty being represented with other faculties on the Senate of the University.

The School of Mining was formerly under the control of a separate board of Governors, but in the year 1916 it became the Faculty of Applied Science of Queen's University.

Kingston is well situated as the seat of a college of engineering and applied science. Geology and mineralogy, two of the fundamental subjects of a mining engineer's education and also important in other scientific professions, are studied to best advantage where the minerals can be seen as they lie in nature, and where geological formations can be examined in *situ*. In a few hours a class of students can be taken to a region so rich in mineral species that about forty different kinds have been secured in an afternoon. There are several geological formations out-cropping within easy walking distance of the city. If to this be added the accessibility by a short railway journey of mines in operation, it will be seen that the opportunities for instructive demonstrations to classes in mineralogy, geology, and mining are very numerous. The metallurgical works at Deloro, eighty miles from Kingston, are also open to our students. It is thus possible to give to the study of mineralogy, geology, mining, and metallurgy, that practical turn which not only adds interest to the college course, but shortens the period between graduation and the attainment of proficiency and of confidence in professional work.

The variety of topographical features in the surrounding country affords the best of material for practice in all branches of surveying, including railway, topographic, hydrographic, and land surveying. The main line of the Canadian National passes through Kingston, which is also a terminus of the Canadian Pacific Railway. The Canadian Locomotive Works, which are the largest locomotive shops in Ontario, are within ten minutes' walk of the University, and are open to students for study and for assisting in engine testing and similar work. Kingston has a large Dry Dock, in whose yards steel construction can be studied practically. The locks of the Rideau Canal can be visited at Kingston Mills, six miles from the heart of the city. There are also several water powers within easy distance. Students of civil, mechanical, and electrical engineering thus have easy access to practical illustrations of their professional studies.

EQUIPMENT AND SPECIAL FACILITIES

THE LIBRARY

The Douglas Library building provides one large reading room, three smaller ones, a number of conference rooms, exhibition rooms and offices for the library and administrative staff.

In the main reading room will be found a collection of some 5,000 volumes of general reference works on open shelves. The general library includes about 160,000 volumes as well as many original manuscripts and prints.

The system of classification used is that of the Library of Congress.

Seven hundred and fifty journals and other serials are currently received.

In addition to the general library there are departmental libraries for physics; chemistry, chemical engineering; mining and metallurgy; geology and mineralogy; civil, mechanical and electrical engineering.

The library of the Medical Faculty together with a biological library, is separately housed in the Old Arts Building.

The Lorne Pierce Collection of Canadian Literature is very rich in first editions, original manuscripts and rare Canadiana.

The Shortt-Haydon Collection of portraits and views relating to Canada is one of the finest collections of its kind.

THE MUSEUMS

The Miller Memorial Museum, named in memory of the late Willet G. Miller, formerly Provincial Geologist of Ontario, has been erected for the Departments of Geology and Mineralogy. The main floor is entirely devoted to museum purposes and contains among other things an excellent collection of economic minerals used in industrial processes; a collection of at least a thousand mounted individual crystals, large collections illustrating the systematic classification of minerals and rocks; another illustrating the ores found particularly in Canadian mines, a stratigraphic assembly of rocks, and a paleontological collection illustrating the geologic life record. The museum is now being re-organized by Professor M. B. Baker.

An Ethnological collection of weapons, utensils, dresses, and ornaments is also housed in the east wing of the museum.

The Biological Museum, in the Old Arts Building, has a large Botanical collection illustrating fully the flora of North America, Europe, Asia, South Africa, and Australia; a Zoological collection representing the Canadian fauna by a large number of prepared specimens of mammals, birds, reptiles, fishes, insects, and mollusca.

THE LABORATORIES

The Chemical Laboratories are in Gordon Hall. On the fourth floor are the laboratories of Medical Organic, Biochemistry, and Water Analysis. On the third floor are two laboratories for General Chemistry, and a laboratory for Electro-chemistry and Colloid Chemistry. On the second or main floor are two laboratories for Quantitative Analysis, two for Organic Chemistry, and one for Industrial Chemistry. On the first or basement floor are three labora-

tories for Qualitative Analysis, and two for Physical Chemistry. Besides these there are a number of small separate laboratories for research work.

The Physics Laboratories occupy the major part of Ontario Hall. The basement contains the large elementary laboratory, the liquid air room, numerous research laboratories and the research workshop. The main floor is given over to undergraduate lecture and laboratory rooms. The second floor has two large lecture rooms, laboratory room for advanced undergraduate classes and for research. The attic is used for workshop and storage purposes.

The Geological and Mineralogical Laboratories are in Miller Hall. In the basement is a laboratory for the preparation of rock sections and for photography and an X-ray laboratory equipped with a Hilger X-ray spectrograph. On the second floor a laboratory occupying the west wing is for elementary classes in Geology. Along the north side of the building is a map room and the petrographical laboratory. On the south side a large draughting room is used by senior students for the preparation of maps and sections required in field courses. On the third floor at the west end is a large laboratory for blowpipe analysis, a dark room equipped with a two circle goniometer, a monochromator and Abbé refractometer. The east wing is a laboratory for post-graduate students, a dark room for photography, a chemical laboratory with space for twelve students, a grinding room for preparation of polished surfaces and an adjoining optical laboratory for petrographic and mineralographic work. Smaller laboratories for research work are equipped with a Hilger E316 spectrograph, a Hallimond Electromagmatic concentrator and facilities for examination of ores by polarized light.

The Biological Laboratories are on the main floor and in the basement of the Old Arts Building. There is a large laboratory for General Botany, one for General Zoology, and one for Medical Biology, as well as smaller laboratories for Plant Physiology and Advanced Botany. Laboratories are available also for research in Plant Physiology, Cytology, and the growth of populations. A very carefully arranged and classified collection of representative invertebrate animals as well as a small but growing entomological collection are available for study. These supplement the Herbarium and the collection of larger animals in the Museum.

THE OBSERVATORY

The Observatory has a transit room, a computing room, and an equatorial room with revolving dome. The equatorial telescope has a six-inch objective, declination and right ascension circles, and a driving clock. The transit has a three and a half inch objective. The further equipment consists chiefly of a striding level, a chronograph, a mean time clock, and a sidereal time clock.

THE MUSIC ROOM

The Music Room in the Douglas Library is ideally furnished and equipped for music study and listening. It houses the Carnegie collection of more than a thousand gramophone records, and a number of musical scores and books which are available on loan through the usual library facilities. The equipment also includes a Steinway grand pianoforte, a radio-phonograph, and a high-fidelity phonograph with separate loud-speaker console. The room is open every afternoon during the session, including Saturday and Sunday.

THE UNIVERSITY CONCERT SERIES

The University Concert Series is available to students for $3 for the season.

The programme for session 1946-47 was as follows: the Trapp Family; Luboshutz and Nemenoff, Pianists; Garbousova, Cellist; and the Baltimore Symphony Orchestra.

The series for 1947-48 includes Mack Harrel, Baritone; Joseph Szigeti, Violinist; Nikita Magaloff, Pianist; and the Baltimore Symphony Orchestra.

In addition there is The Young Artists' Series including the Conservatory String Quartette; Pincusoff and Pizzolongo, Clarinetist and Pianist; and the Winner of the Singing Stars of Tomorrow Contest.

The cost of The Young Artists' Series is 50 cents for students, $1.00 for other subscribers.

FACILITIES FOR FIELD WORK

Geology and Mineralogy. In the vicinity of Kingston a greater variety of economic minerals and metalliferous ores is mined than in any similiar area in Canada. Through the kindness of the managers the various mines may be visited by the Geology and Mineralogy classes, and students may thus obtain valuable information concerning field conditions.

Botany and Zoology. Exceptionally good facilities for field study are provided in the vicinity of Kingston by the great diversity of land surfaces and bodies of water. A wide range of plant and animal associations is within easy reach of the University.

ENGINEERING SOCIETY

The representative student organization of the Faculty of Applied Science is the Engineering Society. All students registered in the Faculty of Applied Science are members of this society. Regular monthly meetings are held and the Society has been fortunate, in recent years, in securing successful engineers to address the students during the session. Any student member who wishes to read a scientific paper before the society will always find the executive of the Engineering Society ready and willing to arrange a date. Prizes are offered in connection with such student papers.

The Society conducts a Technical Supplies Department, where all books prescribed, stationery, note books, drawing paper and instruments, and other supplies, may be purchased at prices but slightly over cost. Any books not in stock will be ordered on payment of a small deposit.

FACILITIES FOR ATHLETES

The University provides ample facilities for athletics. A gymnasium, one of the finest in Canada, was built during the summer of 1930. In the University Grounds is a large covered skating rink with artificial ice. Adjoining the University is the football field, with the George Richardson Memorial Stadium given by Dr. James Richardson, formerly Chancellor of the University, in memory of his brother, Captain George Richardson, a Queen's graduate and a former athlete, who was killed in the Great War. There is room and equipment for all students who wish to take part in football, hockey, basketball, tennis, track athletics, swimming, boxing, fencing, or wrestling.

REQUIREMENTS FOR ADMISSION.

The number of students admitted to the first year of the Faculty of Applied Science is limited. Selection from applicants for admission is made on the basis of their qualifications. Candidates must make application by September 1st on forms which may be obtained from the Office of the Registrar. This application must be accompanied by academic certificates, a certificate of successful vaccination, and a fee of $10 which will be applied on tuition payable at registration. This fee will be returned up until one week before the opening of the session if the student notifies the University that he cannot register.

Candidates for the first year should note that they register on September 16 and their classes begin September 17.

I.—ADMISSION BY MATRICULATION.

*The requirements for admission to the Faculty of Applied Science are as follows:

(a) The Ontario Secondary School Graduation Diploma (Pass Matriculation) including one language in addition to *English,*

(b) Ontario Grade XIII (Honour Matriculation) in the following subjects:

English,

Mathematics (*Algebra, Geometry, including Analytical Geometry, and Trigonometry with an average of 60%.)*

Physics,

Chemistry,

One of: a language selected from *Latin, Greek, French, German, Spanish, Italian,*

Biology *(Botany and Zoology),*

History.

Candidates who have had practical engineering training or who are otherwise specially qualified for an Engineering Course may be admitted at the discretion of the Faculty, on conditions to be determined in each case, even though they do not present precisely the subjects named above.

II.—ADMISSION OF EX-SERVICEMEN AND WOMEN

A summary of training provisions under Post-Discharge Re-establishment Order P.C. 5210 may be obtained from the Registrar.

Ex-servicemen and women applying for admission to the Faculty of Applied Science are expected to offer Matriculation standing as approved by the National Conference of Canadian Universities in June, 1944, as follows:

1. *General education* — minimum:
   Grade XIII standing in English.
   Grade XII standing in History and in French (or another language), or, alternatively, Grade XIII standing in one of these two subjects.
2. *Pre-requisites for first year work*:
   Grade XIII standing in Mathematics (Algebra, Geometry, and Trigonometry), in Chemistry, and in Physics.

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*The experience of many years has shown that a good foundation in and a liking for Mathematics are essential for success in a Course in Applied Science.

III.—ADMISSION BY EQUIVALENT EXAMINATION

The following certificates recognized as equivalent to the Ontario Secondary School Graduation Diploma may be accepted *in so far as they meet the admission requirements of Queen's University:*

Alberta	Junior Matriculation (Grade XI).
British Columbia	Junior Matriculation (Grade XII).
Manitoba	Grade XI.
New Brunswick	Junior Matriculation.
Newfoundland	Associate (Junior).
Nova Scotia	Grade XI (average 60, minimum 50).
Prince Edward Island	First Class Teachers' License or Second Year Certificate from Prince of Wales College.
Quebec	Quebec High School Leaving Certificate. McGill Junior Matriculation.
Saskatchewan	Grade XI.

The following certificates are recognized as equivalent to the Ontario Grade XIII certificate in the subjects in which at least 50% has been made in each paper:

Alberta	Senior Matriculation (Grade XII).
British Columbia	Senior Matriculation (Grade XIII).
Manitoba	First Class.
New Brunswick	Grammar School or First Class Licenses.
Newfoundland	Associate Grade.
Nova Scotia	Grade XII.
Prince Edward Island	Honour Diploma of Third Year, Prince of Wales College.
Quebec	McGill Senior Matriculation. Senior High School Leaving Certificate.
Saskatchewan	Grade XII.
Great Britain	The School Certificate of the various English Universities and the Central Welsh Board; the candidate will be granted Grade XIII standing in those subjects in which he has obtained "credit". Similar standing will be given those having the Leaving Certificate of the Scottish Education Department provided that the subjects are of the Higher Standard.

NOTE.—A certificate from any school which is on the list of schools approved by any University or Technical College of recognized standing in the United States will be accepted as equivalent to matriculation examination *pro tanto.*

IV.—ADMISSION TO ADVANCED STANDING

A student who transfers to Queen's University from another educational institution is admitted to the year for which he qualifies. Ordinarily such a student must spend a minimum of two years in residence in order to obtain the Bachelor of Science degree. Since laboratory accommodation is limited, it may be necessary to refuse admission to certain Courses.

A candidate for advanced standing must submit with his application a Calendar of the institution in which he has studied, together with an official statement of the subjects passed and the standing made.

V.—ADMISSION OF SPECIAL STUDENTS

Students not proceeding to a degree may take any classes for which they are prepared. The work in all classes is so arranged that those who wish to study, either for scientific interest or to improve their qualifications for any particular position, may profitably pursue their studies in the Faculty of Applied Science.

The Faculty will admit under this paragraph, as special students, only such candidates as are fitted to take part of the classes of a course. It will not admit as special students those whom, on account of previous poor records, it is no longer desirable to retain as regular students.

Prospective students under this section should correspond with the Dean of the Faculty of Applied Science in regard to the arrangement of such a course.

MEDALS, FELLOWSHIPS, SCHOLARSHIPS AND PRIZES

I.—MEDALS

Governor-General's Medal

The Governor-General's Medal is awarded each year to the student of the graduating class who has made the highest standing throughout the four years of his Course. A student who has lost a year is not eligible. Grades obtained on supplemental examinations will not be included in determining the candidate's standing.

Departmental Medals

A medal may be awarded annually in each department to the student of the graduating class who has made the highest average standing in all subjects of the third and fourth years, and secured honour standing in his fourth year.

II.—GRADUATE FELLOWSHIPS AND SCHOLARSHIPS

FELLOWSHIPS CONTROLLED BY THE UNIVERSITY

Science Research Fellowships

1. Applications for Fellowships will be received by the Registrar up to May 1st. If no appointment is made by that date further applications will be received up to September 1st.

2. Fellows will be selected and the character of their work will be determined by the Department concerned in consultation with the Dean. The University reserves the right to dismiss a Fellow whose work is not satisfactory.

3. A student appointed to a Fellowship must carry on research work for the whole session and embody the results in a thesis. The research may take the form either of independent investigation or of assistance in an investigation carried on by some department. The Fellow may be required to undertake tutorial work not to exceed six hours a week.

4. The income of the Fellowship will be paid in five instalments, of which the last will be paid only after the thesis has been accepted. A candidate for degree at the May Convocation must submit his thesis by April 20. Except by special permission, other Fellows must submit their theses not later than September 20.

The George Barber Fellowship

Value $750. Given by the Spruce Falls Power and Paper Company for a period of four years.

Awarded for graduate work in Chemistry, Chemical Engineering, Mechanical Engineering, Electrical Engineering, or Civil Engineering, to graduates of Queen's or other Universities. Applicants must be Canadian citizens. Awarded by a committee consisting of the Principal, the Vice-Principal and Treasurer, the Dean of the Faculty of Applied Science, and the heads of the departments concerned. The holder of this Fellowship shall carry on a research project approved by the committee.

The C.I.L. Fellowship in Chemistry and Chemical Engineering

Value $750. Founded by the Canadian Industries Limited for research in Chemistry or Chemical Engineering. This is a Resident Fellowship open to graduates of Queen's or other Universities. Applications must be received by the Registrar by April 1st.

The Cominco Fellowship

Value $750. Founded by The Consolidated Mining and Smelting Company of Canada, Limited.

The holder of this fellowship shall carry on an investigation related to the general field of non-ferrous metals, chemicals, or fertilizers in which *The Consolidated Mining and Smelting Company of Canada, Limited,* is interested. The fellow selected shall devote the major part of his time to the investigation, and shall not hold any position of emolument, or engage in teaching during this period. The fellow shall prepare two reports on his investigations, one report to be submitted about the middle of the fellowship year, the other on completion of the work.

Applicants must be graduates in science or engineering of a recognized university, and preferably British subjects resident in Canada. Applications must be submitted to the Registrar of Queen's University by March 15th.

The Orvil Dryfoos Fellowship

Value $750. Given by the Spruce Falls Power and Paper Company for a period of four years.

Awarded for graduate work in Chemistry, Chemical Engineering, Mechanical Engineering, Electrical Engineering, or Civil Engineering, to graduates of Queen's or other Universities. Applicants must be Canadian citizens. Awarded by a committee consisting of the Principal, the Vice-Principal and Treasurer, the Dean of the Faculty of Applied Science, and the heads of the departments concerned. The holder of this Fellowship shall carry on a research project approved by the committee.

The Milton Hersey Fellowship in Chemistry

This fellowship of the annual value of $400, has been endowed by Milton L. Hersey, M.Sc., LL.D., of Montreal. It is open to graduates of all universities and technical colleges.

The holder of this Fellowship shall carry on research work for the whole session and embody the results in a thesis. The research may take the form either of independent investigation or of assistance in an investigation carried on by some department. The Fellow may be required to undertake tutorial work not to exceed six hours a week.

Applications for Fellowships will be received by the Registrar up to May 1st. If no appointment is made by that date, further applications will be received up to September 1st.

William Neish Fellowship in Chemistry

This Fellowship of an annual value of $400 has been endowed by Ada E. Neish and Laura Neish Black of Kingston. It is open to graduate students in Chemistry from Queen's or another University.

The holder of this Fellowship shall carry on research work at Queen's for the whole session under the direction of some member of the Department of Chemistry and embody the results in a thesis. The Fellow shall be required to give laboratory instruction or its equivalent not to exceed nine hours a week.

Imperial Oil Graduate Research Fellowships

The Imperial Oil Company Limited has established for annual competition four research fellowships of the value of $3,000 each ($1,000 per year payable in Canadian funds for a maximum of three years), open to graduates of any approved university in Canada. These fellowships are offered for graduate work leading to a Doctor's or Master's degree in the fields of Petroleum Engineering, Petroleum Geology, Chemistry or Chemical Engineering, and Mechanical Engineering. Nomination of students for these fellowships is made by the University. They are submitted to the Imperial Oil Scholarship Committee, Imperial Oil Limited, 56 Church Street, Toronto, not later than June 1st, each year. Nomination forms and information about the terms of fellowships are available at the Registrar's Office.

Inco Scholarship

The International Nickel Company of Canada has established a Scholarship of the value of $500 for graduate work in Chemistry, Chemical Engineering, Mining, Metallurgy, Geology and Mineralogy, to be awarded to a student holding the Bachelor of Science degree, who has made consistently high standing throughout the four years of his undergraduate Course.

Applications must be submitted by April 1st each year.

The Shell Oil Fellowship

The Shell Oil Company of Canada has established a Fellowship of the value of $750 plus tuition for graduate work in Chemistry, Chemical Engineering, Mechanical Engineering, Geology, Physics, Geo-physics.

Applications must be submitted by April 1st each year.

J. B. Tyrrell Scholarship in Economic Geology

Founded by J. B. Tyrrell, LL.D., of Toronto.

Value dependent on dividends received. This Scholarship will be awarded to a graduate student who is working in the field of Economic Geology.

Applications must be submitted by April 1st each year.

The Reuben Wells Leonard Fellowships

Under the will of the late Reuben Wells Leonard provision was made for four Fellowships of the value of $500 to be awarded to graduates of the University "who are willing and qualified to undertake independent research work in the interests of higher culture". These Fellowships are tenable only by students in attendance at Queen's.

Application must be made to the Registrar not later than April 1st.

The Reuben Wells Leonard Fellowships

Fellowships of varying amounts will be available during session 1947-48 for Queen's graduates continuing their work at Queen's University. Application for these Fellowships must be received by April 1.

The Reuben Wells Leonard Travelling Fellowship

Value $245. This Fellowship is awarded annually to a student intending to do postgraduate work at a University within the British Empire.

Postgraduate Scholarship in Chemical Engineering

This Scholarship established by a friend of the University, and of the value of $300 is to be awarded on recommendation of the Department of Chemical Engineering and the Dean of the Faculty of Applied Science to a student at the end of the fourth year of the Chemical Engineering course on the basis of ability, academic record, character and personal qualifications.

The purpose of this Scholarship is to enable a student to devote a year to postgraduate study, attending a number of lecture courses, and devoting part of his time to research work.

FELLOWSHIPS NOT CONTROLLED BY THE UNIVERSITY

Royal Society of Canada Fellowships

Ten annual fellowships to be known as the Royal Society of Canada Fellowships, each of $1500, and open on equal terms to men and women, have been endowed through the generosity of the Carnegie Corporation. They are tenable at institutions of learning or research, save in exceptional circumstances outside of Canada, and are available for advanced research in Literature, History, Anthropology, Sociology, Political Economy, or allied subjects, in French or English; and in Mathematics, Chemistry, Physics, Geology, Biology, or subjects associated with any of these sciences.

An applicant for a Fellowship should be a graduate of a Canadian university or college, or should have received an equivalent training in a Canadian institution possessing adequate facilities in his particular subject, and, except in special cases, should have the Master's degree or its equivalent, or, preferably, have completed one or more year's work beyond that degree.

Applications, addressed to "The Secretary, Royal Society of Canada Fellowships Board, Ottawa, Canada," should contain particulars of the candidate's age and place of birth, a full statement of his academic career, with copies of original papers and any other evidence of his ability or originality in his chosen field; also an indication of the particular work he proposes to undertake, at what institution, and under whose direction; and should be supported by recommendations from the head of the department of the institution in which the candidate has studied, and from the instructors under whom he has chiefly worked. All these papers should be in duplicate.

Further particulars may be obtained from the Registrar.

The following graduates of Queen's have held these Fellowships:

1932-33, Christine Rice; 1932-33, H. W. Fairbairn; 1933-34, G. A. Harcourt; 1934-35, D. C. G. MacKay; 1936-37, W. C. Güssow; 1937-38, A. W. Currie; 1938-39, J. S. Marshall; 1941-42, J. Dingwall; 1942-43, J. L. Evans.

Exhibition of 1851 Science Research Scholarship.

This scholarship, of the annual value of £250 sterling, is awarded by Her Majesty's Commissioners for the Exhibition of 1851 to students who have given evidence of capacity for original research, and are under 26 years of age. A given number of scholarships are awarded annually to students in Canada recommended by the Universities approved by the Commissioners.

The nominee must be a British subject, must have been a bona fide student of science for three years, must have been a student of the University for a full year immediately before his nomination, must be a student of the University at the time of his nomination, and must pledge himself not

to hold any position of emolument whilst holding the scholarship without special permission from the Commissioners. He is recommended to the Commissioners by the Senate of the University. The scholarship will be tenable ordinarily for two years and in cases of exceptional merit for three years. The scholar will, in the absence of special circumstances, be required to proceed to a country other than that in which he received his scientific training, and there pursue some investigation likely to promote technical industries or scientific culture. The particular investigation the student proposes to pursue must be stated before a scholarship can be awarded.

Students of the Faculty of Applied Science are eligible for this scholarship.

Recommendations must be received at the office of the Commissioners before June 1.

The following Science Research scholars have been appointed from Queen's University:

1894, N. R. Carmichael; 1896, T. L. Walker; 1898, F. J. Pope; 1900, W. C. Baker; 1901, C. W. Dickson; 1904, C. W. Knight; 1905, F. H. McDougall; 1907, C. Laidlaw; 1909, N. L. Bowen; 1911, W. A. Bell; 1913, J. R. Tuttle; 1915, R. C. Cantelo; 1921, D. G. H. Wright; 1924, R. H. F. Manske; 1924, D. C. Rose; 1926, H. M. Cave; 1928, B. W. Sargent; 1931, E. H. Charlesworth; 1932, G. S. Farnham; 1932, W. J. Henderson; 1934, W. E. Bennett; 1935, J. S. Marshall; 1937, A. G. Ward; 1946, G. R. G. Lindsey.

The Rhodes Scholarship

1. *General Regulations*:—A Rhodes Scholarship is tenable at the University of Oxford and may be held for three years. Since, however, the majority of Rhodes Scholars obtain standing which enables them to take a degree in two years, appointments are made for two years in the first instance, and a Rhodes Scholar who may wish to remain for a third year will be expected to present a definite plan of study for that period satisfactory to his College and to the Rhodes Trustees.

Rhodes Scholars may be allowed, if the conditions are approved by their own College and by the Oxford Secretary to the Rhodes Trustees, either to postpone their third year, returning to Oxford for it after a period of work in their own countries, or may spend their third year in postgraduate work at any university of Great Britain, and in special cases at any university on the continent of Europe, the overseas dominions, or in the United States, but not in the country of their origin.

The stipend of a Rhodes Scholar is fixed at £400 per year. At most Colleges, and for most men, this sum is not sufficient to meet a Rhodes Scholar's necessary expenses for Term-time and Vacations, and Scholars who can afford to supplement it by £50 per year from their own resources will find it advantageous to do so.

2. *Conditions of Eligibility*:—A candidate to be eligible must:

1. Be a British subject, with at least five years' domicile in Canada, and unmarried. He must have passed his nineteenth year, but not have passed his twenty-fifth birthday on October 1st of the year *for* which he is elected.

2. Have reached such a stage in his course at one of the Universities in Canada that he will have completed at least two years at the university in question by October 1st of the year *for* which he is elected.

Candidates may apply either for the province in which they have their ordinary private domicile, home or residence, or for any province in which they have received at least two years of their college education before applying.

In that section of the Will in which he defined the general type of scholar he desired, Mr. Rhodes wrote as follows:

"My desire being that the students who shall be elected to the scholarships shall not be merely bookworms, I direct that in the election of a student to a Scholarship regard shall be had to:

1. his literary and scholastic attainments;

2. his fondness for and success in manly outdoor sports such as cricket, football and the like;

3. his qualities of manhood, truth, courage, devotion to duty, sympathy for and protection of the weak, kindliness, unselfishness and fellowship, and

4. his exhibitions during school days of moral force of character and of instincts to lead and to take an interest in his schoolmates for those latter attributes will be likely in after life to guide him to esteem the performance of public duty his highest aim."

Full particulars may be obtained from D. R. Michener, 372 Bay St., Toronto, Secretary of the Selection Committee for the Province of Ontario. Two Scholarships may be awarded annually in the provinces of Quebec and Ontario if qualified candidates appear.

Each candidate for a Scholarship is required to make application to the Secretary of the Committee of Selection of the Province in which he wishes to compete, not later than November 10th. Application forms may be obtained from the Registrar's Office.

The following graduates of Queen's University have been awarded Rhodes Scholarships:

1905, J. M. Macdonnell; 1906, A. G. Cameron; 1907, N. S. Macdonnell; 1911, S. Scott; 1912, H. S. Smith; 1914, A. G. Cumming; 1919, H. R. MacCallum; 1920, K. E. Taylor; 1922, A. D. Winspear; 1925, L. F. Kindle; 1926, D. A. Skelton; 1936, J. G. Davoud; 1937, G. M. Brown; 1938, G. P. Grant; 1941, G. S. Bowell and R. S. Rettie; 1947, F. G. Hooton.

This Scholarship is not controlled by the University.

III.—SCHOLARSHIPS AND PRIZES

Scholarships in this section may be held only by students who register in the Faculty of Applied Science in the year following the award. By special permission of the Faculty, the recipient of a Scholarship, available in the third and fourth years of his Course, may postpone the use of the Scholarship for one year in order to engage in practical work connected with his chosen profession.

Scholarships and prizes are awarded on the standing obtained by a student on a regular year of work. A student who is repeating his year, or who fails in a class in the current year is not eligible.

An undergraduate student may not hold more than one Faculty Scholarship in any one year. This regulation does not apply to prizes. In the event of a student qualifying for several scholarships, he is awarded the most valuable and, where possible, given the honour of the others. Eligibility for a scholarship requires an average of at least 66% on the work on which the scholarship is awarded.

SCHOLARSHIPS FOR AWARD IN THE FIRST YEAR

University Scholarships

One Scholarship of the value of $150 and one of the value of $75 will be awarded to students in the first year, on all the work of the year.

Science '39 Scholarship

Value $100. Founded by the University, but now maintained by the Class of Science '39. Awarded to a student in the first year on all the work of the year.

Science '40 Memorial Scholarship

Value $100. Founded by the University, but now maintained by the Class of Science '40 as a memorial to its members who gave their lives in the Second World War. Awarded to a student in the first year on all the work of the year.

Science '41 (J. O. Watts Memorial) Scholarship

Value $100. Founded by the University, but now maintained by the Class of Science '41 in memory of Mr. J. O. Watts, lecturer in the Department of Mathematics, 1931-1941. Awarded to a student in the first year on all the work of the year.

Science '43 Memorial Scholarship

Value $100. Founded by the University, but now maintained by the members of Science '43 in memory of their classmates

Douglas Gordon Cameron Chown
Howard Elfric Davis
Archie Hunter
Clyde Crosby Kendall
Gordon William Lawry
Donald John Sterling,

who were killed on active service during World War II. Awarded to a student in the first year on all the work of the year.

Science '45 Memorial Scholarship

Value $75. Founded by the University, but now maintained by the Class of Science '45 as a memorial to its members who gave their lives in the Second World War. Awarded to a student in the first year on all the work of the year.

Science '46 Memorial Scholarship

Value $75. Founded by the University, but now maintained by the Class of Science '46 as a memorial to its members who gave their lives in the Second World War. Awarded to a student in the first year on all the work of the year.

(This Scholarship will be awarded for the first time in May, 1948.)

William Wallace Near Scholarship

Value $100. Established under provisions of the will of the late William Wallace Near of Toronto. Awarded to a student in the first year on all the work of the year.

Robert Bruce Scholarships

Under provisions of the will of the late Robert Bruce of Quebec the University has established a Scholarship worth about $70 in each of the Faculties of Arts, Applied Science, and Medicine. Until 1948 the award is limited to students of Scottish extraction.

The scholarship in the Faculty of Applied Science is awarded to a student in the first year on all the work of the year. One-third of the value of each scholarship is paid to the winner in each of the second, third, and fourth years of his Course, provided that he is in attendance in the Faculty of Applied Science.

George and Mary Louise Patton Scholarship

Value about $70. Awarded to a student in the first year on all the work of the year.

N. F. Dupuis Scholarship

Value $50. Founded by the graduates as a mark of their appreciation of the long and effective services of Dr. N. F. Dupuis, as Dean of the Faculty of Applied Science and Professor of Mathematics. Awarded to a student in the first year on the standing obtained in the courses in Mathematics.

Roberta McCulloch Scholarships

Two Scholarships of the value of $40 and $30 respectively, founded by the late Andrew McCulloch, M.A., of Thorold. Awarded to students in the first year on the basis of standing in English.

Dr. William Moffat Scholarship

Value $20. Founded by Dr. William Moffat, of Utica, N.Y. Awarded to a student on the basis of first year Chemistry. The award will be made on combined results of class work and examination.

William Coombs Baker Memorial Prize

A prize of the value of about $22 in books selected from a list approved by the Department of Physics. This prize has been founded by graduates in memory of William Coombs Baker, formerly the Robert Waddell Professor of Experimental Physics at Queen's University. Awarded to the student making the highest standing in Physics I.

Pipe Band Prize

Value $25. Maintained by the Queen's University Pipe Band. Awarded to the best piper among first year students in all faculties on the basis of a piping contest.

SCHOLARSHIPS FOR AWARD IN THE SECOND YEAR

University Scholarships

Two Scholarships of the value of $150 each will be awarded to students in the second year on all the work of the year.

Alexander Macphail Scholarship

Value $100. Founded by the University, but now maintained by the Class of Science '14. Awarded to a student in the second year on all the work of the year.

W. P. Wilgar Memorial Scholarship

Value $100. Founded by the University, but now endowed by the Classes of Science '03-'06 and other friends of the late Professor W. P. Wilgar, B.Sc. '03. Awarded to a student in the second year on all the work of the year.

Science '42 (Harry Beaty Memorial) Scholarship

Value $100. Founded by the University, but now maintained by the Class of Science '42 in memory of one of their members, Harry G. Beaty, who was killed on active service on July 30th, 1941. Awarded to a student in the second year on all the work of the year.

William Wallace Near Scholarship

Value $100. Established under the provisions of the will of the late William Wallace Near of Toronto. Awarded to a student in the second year on all the work of the year.

Scholarships of the Association of Professional Engineers

Two Scholarships of the value of $100 and $75 respectively, founded by the Association of Professional Engineers of Ontario. Awarded to students in the second year on all the work of the year.

Toronto Alumni Scholarship

Value $100. Given by the Toronto Branch of the General Alumni Association for a period of five years. Awarded to a student in the second year on all the work of the year.

Mowat Scholarship

Value $40. Founded by the late John McDonald Mowat, B.A., '95. Awarded to a student in the second year on all the work of the year.

Science '11 Scholarship

Value $20. Awarded to a student in the second year on all the work of the year.

Dr. William H. Nichols Scholarship in Chemistry

Value $40. Founded by Dr. William H. Nichols. Awarded to a student in the second year on the standing obtained in Qualitative Analysis I.

J. J. Denny Memorial Scholarship

Value $100. Founded by the Classes of Science '03-'06 and other friends of the late James J. Denny, M.Sc. '21. To be awarded upon entrance to the third year of the Course in Mining or Metallurgy, to the student who, in the judgment of the Faculty of Applied Science, is most worthy of the award.

SCHOLARSHIPS AND PRIZES FOR AWARD IN THE THIRD YEAR

Joseph Abramsky Scholarship in Mechanical Engineering

Value $50. Founded by his sons in memory of the late Joseph Abramsky. Awarded to a third year student in Mechanical Engineering on all the work of the year.

Manley B. Baker Scholarships in Geology

Two Scholarships of the value of $125 and $75 respectively, founded by Agnes Moreland Baker. Awarded in the Faculties of Applied Science or Arts to the two students in Mineralogy I, and the first two courses in Geology who are eligible for the award. Mineralogy III. may be considered as a course in geology. These Scholarships are offered to students proceeding in Course C; Course A (Geology Option); or Honours Geology in Arts.

The Major James H. Rattray, M.C., Scholarship in Mining and Metallurgy

Value $20. Founded by Major James H. Rattray, M.C. Awarded for general proficiency in Mining or Metallurgy at the end of the third year, and tenable by a student in residence in the fourth year. In making the award, the Scholarship Committee shall take into account aptitude as well as academic standing.

Kenneth B. Carruthers Scholarship in Mining Engineering

Value $110. Founded in memory of Major Kenneth B. Carruthers, B.Sc., who was killed at Passchendaele in October, 1917. Awarded to a third year student in Mining Engineering on all the work of the year.

Kenneth B. Carruthers Scholarship in Metallurgical Engineering

Value $110. Founded in memory of Major Kenneth B. Carruthers, B.Sc., who was killed at Passchendaele in October, 1917. Awarded to a third year student in Metallurgical Engineering on all the work of the year.

Isaac Cohen Scholarship in Electrical Engineering

Value $100. Awarded to a third year student in Electrical Engineering on all the work of the year.

E. S. Noble Scholarship

Value $200. Given by the Spruce Falls Power and Paper Company for a period of four years. Awarded to a third year student in Chemistry, Chemical Engineering, Mechanical Engineering, or Electrical Engineering, on the basis of the spring examinations.

Reuben Wells Leonard Penultimate Year Scholarships

Two Scholarships of the value of $300 and $200 respectively. Awarded to the students in the third year obtaining highest and second highest standing on all work.

Susan Near Scholarships

Scholarships of the total value of $500. Established under provisions of the will of the late Susan Near of Toronto. Awarded to students in the third year on all the work of the year. Apportioned amongst all Departments in Scholarships of $75, $50, and $25, each Department to have one or more Scholarships according to the number of students in each. The exact distribution is announced at the beginning of each session.

William Wallace Near Scholarships

Three Scholarships of the value of $100 each. Established under the provisions of the will of the late William Wallace Near of Toronto. A Scholarship is awarded in each of the three Courses, *Chemistry, Chemical Engineering,* and *Civil Engineering* to a student in the third year on all the work of the year.

Scholarships of the Association of Professional Engineers

Three Scholarships of the value of $100, $75, and $50 respectively. Founded by the Association of Professional Engineers of Ontario. Awarded to students in the third year on all the work of the year.

Fifth Field Company Scholarship

Value $40. The Fifth Field Company Scholarship is provided by funds accumulated for this purpose by the officers, N.C.O.'s, and sappers of that unit since the first Great War. Awarded to a student in the third year Course in Civil, Mechanical, or Electrical Engineering on the basis of Hydraulic Engineering I.

Engineering Institute of Canada Prize

Value $25. Awarded by the Engineering Institute of Canada to the student in the third year who has proved himself most deserving, as disclosed by the examination results of the year in combination with his activities in the students' engineering organization, or with a local branch of a recognized engineering society.

Science '44 Memorial Prize

Value $100. Maintained by the Class of Science '44 as a memorial to the members of the Class who gave their lives in the Second World War. Awarded to a third year student on the basis of extracurricular student activities, provided that he has passed all the work of the year.

PRIZES FOR AWARD IN THE FOURTH YEAR

L. M. Arkley Prize

Value $40. This is a prize founded by the Scots Run Fuel Corporation of Morgantown, W. Va., in recognition of Professor Arkley's interest in the proper methods of purchasing, analyzing and burning coal. To be awarded to the fourth year student in Mechanical Engineering who gives evidence that he understands the sampling and analyzing of coal and submits, before April 1st of each year, the best paper on the phase of the subject assigned.

The Major James H. Rattray, M.C., Scholarship

Value $100. Founded by Major James H. Rattray, M.C. Open to students in either the Faculty of Arts or the Faculty of Applied Science; awarded ordinarily on the basis of standing in Economic Geology (including Geology of Canada), a subject of the fourth year, and tenable by a student registered for graduate work in the following year. In any year in which the Scholarship cannot be so used, it may be awarded at the discretion of the Scholarship Committee, either as a prize in the year of award or as a general proficiency scholarship at the end of the third year, and held by a student whose programme includes Economic Geology in the following year. In determining the award, the Scholarship Committee take into account aptitude as well as academic standing.

E. T. Sterne Prize in Chemical Engineering

Value $25. To be awarded to a student in Chemical Engineering after finishing his third year, for the best essay describing his summer's work. Essays to be handed in by December 31st. The donor desires that emphasis be laid on a discussion of the theoretical principles in Chemistry and Physics underlying any one of the manufacturing processes described.

GENERAL SCHOLARSHIPS AND PRIZES

B'nai B'rith Kingston, Bursary

Value $50. Founded by the B'nai B'rith Lodge of Kingston.

This Bursary will be awarded annually to a student of promising ability but straitened circumstances. The award will be made on the basis of the April examinations. Applications will be received by the Registrar up until April 1 of each year.

Prizes of The Canadian Institute of Mining and Metallurgy

Premiums and prizes at the discretion of the Council may be given annually for papers read by student-members of the Institute and affiliated students during the year. Any such award will be made by the Council within three months after the Annual Meeting.

Khaki University and Y.M.C.A. Memorial Fund

This fund is part of a sum, left from the Khaki University after the Great War, which was divided among the Canadian Universities.

The interest, amounting to $240, will be used to award one or more scholarships open to undergraduate students in any Faculty. In awarding these scholarships the need as well as the standing of applicants will be considered and preference will be given to returned men, or sons or daughters of soldiers of the Great War. Applications will be received by the Registrar up to April 1st.

Reuben Wells Leonard Special Scholarships

Special Reuben Wells Leonard Scholarships for merit and need will be awarded in varying amounts to students of promising ability but straitened circumstances. The awards will be made on a loan or service basis.

George J. MacKay Prize in Metallurgy

Value $25. A prize given by the Mining and Metallurgical Society of Queen's University in memory of Professor George J. MacKay, formerly Head of the Department of Metallurgy at Queen's University. This prize will be awarded annually for seven years to the student in any year who submits, by February 1st, the best essay dealing with some branch of Metallurgy.

A. E. Segsworth Prize

Value $40. Founded by R. F. Segsworth, Esq., Toronto, in memory of his brother, A. E. Segsworth, B.A., Ph.D. The prize is awarded to the student of any year who hands in before December 1st the best account of his previous summer's experience in practical underground mining.

O. M. Montgomery Memorial Fund

Established by the Aluminum Company of Canada in memory of Mr. O. M. Montgomery, who graduated from Queen's University in Electrical Engineering in 1905. This Fund will be used to provide bursaries for worthy students in need of financial help. It will be administered by a Committee consisting of the Principal, the Vice-Principal, the Registrar, and a representative of the Aluminum Company. Awards may be made in any Faculty, and may only be regarded as gifts at the discretion of the Committee when made to sons or daughters of employees of the Aluminum Company. Otherwise repayment is expected in one or both of the various ways:

(1) By service to the University if the beneficiary has time and is qualified for the work available. Such service shall be assistance in a department, or office, or library, or laboratory, or some other comparable employment.

(2) By return in cash of the sum granted, or of the part not worked out. In such case the award is regarded as a loan without interest, payable at some convenient time to be agreed upon.

The Harry F. Bennett Educational Fund of The Engineering Institute of Canada

This fund was established by subscription from members of The Engineering Institute of Canada in memory of the late Harry F. Bennett, M.E.I.C., who for six years prior to his death was chairman of the Institute's Committee on the Training and Welfare of the Young Engineer, and who accomplished so much in this field by his untiring efforts.

One purpose of the fund is to make loans to deserving students who need financial assistance to enable them to study engineering sciences at University level, and who have proved themselves by successfully completing their first year in engineering or the equivalent.

Application blanks may be obtained at the office of the Dean of the Faculty. The regulations are simple and the application of any student will be given immediate and careful attention.

C.O.T.C. Scholarship

Value $100. Maintained by the regimental funds of the Queen's University Contingent of the Canadian Officers' Training Corps. To be awarded annually to a member of the Contingent who is not an officer. The selection will be made by the Committee on Military Education from a group recommended by the Commanding Officer. In determining the award academic standing will be taken into consideration. (If the winning student is in his final year the scholarship will be awarded as a prize.)

American Legion Scholarship

Value $100. Established by Dr. George Hayunga of New York.

To be awarded annually to a student officer of the Queen's University Contingent of the Canadian Officers' Training Corps, the selection to be made by the Committee on Military Education from a group nominated by the Commanding Officer. In determining the award academic standing will be taken into consideration. (If the winning student is in his final year the scholarship will be awarded as a prize.)

Social Engineering Prize

Value $50. Founded by A. E. MacRae of Ottawa. Awarded annually under the following conditions as stated by the donor.

"The object of this prize is to promote on the part of the individual the practice of factually appraising his every act from the point of view of others concerned so that he may make it easiest for them to co-operate in achieving a desired objective. It is based on the idea that maximum social progress primarily demands of education the production in individuals of capacity to lead others in the doing of things which, in the long view, are for the continuing good of all. A keen sense of responsibility for the common good, as opposed to the mere temporary benefit of a particular agency, is essential in efficient social leadership.

"It is to be presented annually to the student in attendance at Queen's University who, prior to the beginning of his or her graduating year, has developed and exhibited greatest capacity in leading the student body, or any portion of it, in accomplishing purposes which are considered good by the majority of the student body.

"The recipient shall be selected by a committee consisting of the presidents of the faculty societies and the Levana Society and the Principal of the University or his nominee."

Bennett Pipe Band Prize

Established by Mr. P. A. Bennett of Kingston, Ontario. Three medals of gold, silver, and bronze to be awarded each year to the three most proficient pipers of the Queen's University Pipe Band.

IV.—THE DOUGLAS TUTORSHIPS

At the beginning of session 1910-1911 a gift from Dr. James Douglas, of New York, made possible the establishment of a system by which first year students are tutored by men selected from the senior years. The instruction is given out of class hours and as each tutor gives his whole attention to not more than five students in a period, the result is that of individual teaching.

REGULATIONS

N.B.—Students taking the regular course are subject to all Rules and Regulations immediately upon publication, unless otherwise specified.

1. The Faculty may at any time, either during the term, or after its completion, require any student to withdraw whose conduct, attendance, work or progress is deemed unsatisfactory.

2. Registration.—Students of the first year register and pay fees one week before the opening of session. Students of other years register and pay fees on the first day of the session. A student who fails to register at the prescribed time pays an additional fee of $3.00 on the first day, with $1.00 for each day after that date, unless granted exemption by the Faculty. No student proceeding to a degree may register after the tenth day unless given permission by the Faculty before the opening of the Session.

A student entering the Faculty of Applied Science for the first time must submit a certificate showing successful vaccination.

3. Attendance.—Students are required to attend seven-eighths of their class lectures before permission is given to write the examinations, and seven-eighths of their laboratory hours before their laboratory work is certified. Exemption from this rule may be obtained only on application to the Faculty. All absences for whatever cause, including illness or late registration, may not exceed one-eighth of the total number of hours of work required in any subject.

4. Courses.—All students take the subjects required in their courses in conformity with the calendars of their year of attendance. If a student wishes to change his course, he must first obtain the permission of the Faculty.

5. Sessional Examinations.—Sessional examinations are held in all the subjects prescribed in the various courses. Fifty per cent. is required in each subject for pass standing. In determining a student's standing at a sessional examination, professors are empowered to take into account his entire class record.

Students take the April examinations in all classes in which they are registered. If they fail in more than four classes including practical classes in which no written examinations are held, they are regarded as having lost their year.

Students who fail in not more than four classes may write supplemental examinations in the following September. Students who fail in more than one supplemental must repeat the year. Students who twice fail a year are required to withdraw.

A student may not enter the third year until he passes all the examinations of the first year, or the fourth year until he passes all the examinations of the second year. Surveying Field Work I is regarded as a second year class and comes under this regulation both in respect to back classes and to admission to the fourth year. A student who is debarred from entering the third year because of back classes in the first year, or from entering the fourth year because of back classes in the second year, is not allowed to write subsequent examinations in these classes without special permission from the Faculty.

6. Repeaters.—No student may repeat more than one year of his course except by special permission of the Faculty.

7. Mid-Term Examinations.—Examinations are held for all first year students about the middle of the Autumn term in the regular class hours.

8. Mid-Session Examinations.—Two hour examinations in all subjects are held for first and second year students the week before the Christmas holidays. A student repeating his first year who fails in four or more of these examinations is required to withdraw from the faculty. A student repeating his second year who fails in more than four subjects is required to withdraw. A proper proportion of fees paid is refunded to students required to withdraw. The attention of all students is called to Regulation 1.

Final examinations are held at the beginning of the second term in all subjects in which the instruction terminates at that time. No other papers are set in these subjects until the following September.

9. Supplemental Examinations.—Unless specially excused by the Faculty upon application received at the Registrar's office before July 15th, all students who fail in one or more subjects of their year up to a total of four must write supplemental examinations in all such subjects in September of the same year, as a condition of admission to the next higher year of their course.

A student who has one failure in the April examinations of his final year must write off this class by the following April.

A student who is not registered in the session in which he wishes to take any supplemental examinations pays the registration fee of $10 in addition to the examination fee.

Students may take supplemental examinations at approved outside centres if they make application to the Registrar by July 15th.

10. Penalty For Failure To Write.—If a student fails to write an examination from which he has not been excused by the Faculty, a penalty of $10 is charged. The student must pay in addition the regular supplemental examination fee of $10.

11. Practical Work.—Students are required to take the practical courses given in the calendar unless they have followed similar courses in other educational institutions. Instructors may, at their discretion, modify the work for students who have had experience in the field, in engineering works, etc. Such students may be set immediately at more advanced work than that required of those who have not had such experience.

12. Excursions.—The excursions are compulsory for all fourth year students in courses A, D, M, E, F, and G, and third year students in courses A, B, and M.

13. Vacation Work.—Before applying for a degree a candidate is required to submit certificates of having had at least six months' employment of a nature, that in the opinion of the departments concerned, shall have given him suitable experience in the practice of his profession.

14. Graduation.—Application for degree must be made before March 15 on forms which may be obtained from the Registrar.

GENERAL INFORMATION

EXPENSES

The following statement of expenses for a session in normal times is compiled from information obtained from students who have kept an account of their expenditures. Personal expenses are not included in the estimate.

Class, Hospital, Athletic and other fees	$255.00		$255.00
Board, lodging and laundry	325.00	to	385.00
Books and Stationery	35.00	to	45.00
Excursions, Field and Technical	15.00	to	45.00
	$630.00	to	$730.00

The average student pays for board from $6.50 to $7.00 a week; and for a room $3.50 to $4.00 a week. A few pay as little as $10.00 for board and room; while others, with more expensive tastes, pay over $12.00. Any student may count on finding satisfactory board and lodging at from $10.50 to $11.50 a week.

Lists of Boarding Houses for men students may be obtained from the Housing Office. Meals may be obtained at the cafeteria in the Students' Union.

PHYSICAL WELFARE OF STUDENTS

Every student is required upon registration to contribute $4 towards a health insurance fund. In return the student has the free services of the University medical officer and a special hospital rate of fifty cents a day. Details of the plan are given in a printed leaflet which may be had on request.

All students in their first year are required to take physical training for two hours a week, unless excused on account of military training. They are examined by the University physician, who prescribes proper exercises to correct any physical defects.

VACCINATION

Every student registering for the first time must submit evidence of successful vaccination.

TUBERCULIN TESTS

Tuberculin tests are given to all students entering Queen's University for the first time. This service is free of charge but those who react positively are expected to have an X-ray examination at their own cost.

STUDENT SELF-GOVERNMENT

Queen's was the first University in Canada to introduce student self-government. All students are members of the Alma Mater Society, the chief instrument of student government, and are expected to share in its duties and responsibilities.

ALMA MATER SOCIETY LECTURE

In 1939, as a contribution from the student body to the Centenary Endowment Fund, the Alma Mater Society gave the University its accumulated reserve of $1711. The income is used to provide an annual lecture known as the Alma Mater Society Lecture.

MILITARY SERVICES

Canadian Officers' Training Corps

The Queen's University Contingent of the C.O.T.C., formed in 1914 by Lt.-Col. A. B. Cunningham and reorganized following the First World War by Colonel A. Macphail, C.M.G., D.S.O., is now commanded by Lt.-Col. E. A. Walker.

The object of the C.O.T.C. training policy is to qualify selected University undergraduates for commissions on graduation in the various corps of the Active Force, Reserve Force, and Supplementary Reserve Force of the Canadian Army.

The training programme consists of a short theoretical course in Military Studies at the University and annual practical military training for a period of approximately four months at the Active Force Corps Schools at officers' rates of pay.

University Naval Training Division

The University Naval Training Division, Queen's University, was organized in March 1943, under the direction of Lieutenant S. T. Hill, Commanding Officer H.M.C.S. "Cataraqui".

A minimum of 110 hours' training is given during the academic year, and two weeks' spring training in H.M.C.S. "Cornwallis" or H.M.C.S. "Naden" at the end of the academic year.

Undergraduates in science or non-science courses are enrolled as ratings on divisional strength. Students in mechanical, electrical engineering and engineering physics courses are enrolled as Stokers II. Students in other university courses, except Medicine, are enrolled as ordinary seamen. Students who fail to pass the medical examination for ordinary seamen may be considered for other rates still being recruited.

EMPLOYMENT SERVICE

An Employment Service has been in successful operation at the University for several years. It is under the jurisdiction of the Service Control Committee of the Engineering Society and administered by the Secretary of the General Alumni Association. It is financed by the Engineering Society and the University. The objects of the Service are to assist graduates in all Faculties to secure suitable positions, and to help students obtain work during vacation periods.

Communications should be addressed: Manager, Employment Service, Queen's University.

FRATERNITIES

By resolution of Senate no student registered with the University may form or become a member of any chapter of any externally-affiliated fraternity or sorority at or near Kingston.

THE STUDENTS' MEMORIAL UNION

The Students' Memorial Union was built to commemorate the service of the students and graduates of Queen's in the Great War.

Every male student is a member of the Union, which is really a club, where the men of all Faculties may meet in a University building designed for that particular purpose and privilege.

There are the usual club facilities, dining room, lounge, billiard room, reading room and committee rooms.

FEES

Sessional Fees (including registration, tuition, examination, degree, library, laboratory, health insurance and student interests. The fee for athletics, which is part of student interests, gives admission to all home games except play-offs) :—

If paid in full $255.00

If paid in instalments:
1st payment, on registration $144.00
2nd payment, at the opening of the second term $116.00

Fees may be paid in two instalments, in which case an additional $5 will be added to the first instalment. The first instalment and the laboratory deposit must be paid at the time of registration in September, the balance on or before January 5, 1948, for first and second years, January 6 for third and fourth years. No student will be admitted to classes until the above conditions have been complied with, nor will he be permitted to continue the work of the second term until the fees have been paid in full.

Fees must be remitted by accepted cheque, postal order, or bank draft, payable to Queen's University. Cheques or bank drafts on any point where there is a branch of the Bank of Montreal will be received at par; all other cheques should have ⅛ of 1%, minimum 15c, added to cover exchange, or be drawn plus exchange.

Deposits.—For covering expenses of breakages, etc., a first year student must deposit $10 with the Treasurer. If at any time the amount of breakages, etc., exceeds $3, an additional deposit of $5 must be made.

For second, third and fourth years the deposit is $5 except in the following courses:—

Second Year Courses A, B, C, D, M $10.00
Third Year Courses A, C and M 10.00
Third Year Courses B and D 15.00
Fourth Year Course B 15.00

Charges are made for the use of platinum, and other expensive chemicals and apparatus. All money to the credit of the depositors is returned at the end of the session on presentation of the deposit receipt properly certified.

The fees below are payable as they are incurred.

Special Charges.

Pro tanto allowance of courses	$10.00
Late registration. See Regulation 2	3.00
Supplemental Examination, one subject	10.00
Each additional subject	2.00
Writing at outside centre in April (if permitted), each paper	5.00
Late application for supplemental examination or graduation	3.00
Special fee for Surveying Field Course	15.00

In addition to regular examination fees, supplemental or otherwise, there are the following fees for special examinations:

Examination in one paper	$ 5.00
Examination in two or more papers	10.00

Fees for Single Classes.

Registration	10.00
Student Interests	23.00
Any course of lectures (limited to five courses)	30.00
Drawing, One Course, per Session	20.00
Surveying, One Course, per Session	20.00
Assaying Laboratory, per Session	10.00
Chemical Laboratory, per Session	20.00
Petrographical Laboratory, per Session	10.00
Mechanical, Electrical or General Engineering Laboratory, per Session	20.00

A student not paying full fees who wishes to take for credit any course not required in his degree prescription must obtain permission to do so from the Departments concerned and must pay the fees for extra classes as laid down in the Calendar.

Fees for M.Sc. Work

*Total Sessional Fee (including laboratory fee, and student interests)	$143.00
Laboratory deposit	10.00

Additional charges may be made in the case of students requiring special material and apparatus.

*If a student decides to spread his work over two years, he pays each year $93.00 for total sessional fee, and $10 for laboratory deposit.

Graduation and Other Fees

No graduation fee is charged for B.Sc. unless the degree is taken in absentia, in which case there is a charge of $10.00.

Graduation M.Sc.	$20.00

DEGREES

I. Bachelor of Science.

1. The degree of B.Sc. is given on the satisfactory completion of a four years' course in any one of the following departments:—

A—Mining Engineering; B—Chemistry; C—Mineralogy and Geology; D—Chemical Engineering; M—Metallurgical Engineering; E—Civil Engineering; F—Mechanical Engineering; G—Electrical Engineering; H—Physics.

A graduate in any Course who wishes to take the degree of B.Sc. in any other Course, or an undergraduate who wishes to change from one Course to another, takes all the classes which he has not already passed in the Course, or by examination satisfies the Department concerned as to his knowledge of the subjects involved.

Graduation with Honours.—Honour standing is given to any student who graduates with an average of seventy-five per cent. or upwards on the full work of the fourth year of his course. Credit for Honour standing is given on the diploma, and in the list of graduates a mark of distinction is placed against the names of those graduating with Honour standing.

The following percentages are required for standing in all courses: Division I—75% and over; Division II—62% to 74%; Division III—50% to 61%.

2. The degrees of B.A. and B.Sc. are given on the satisfactory completion of a six years' course in Arts and Applied Science. See pages 66-67.

A candidate for graduation must have completed either a four or six years' course and have passed all the required examinations.

II. Master of Science

The Degree of Master of Science (M.Sc.) is granted to candidates who have graduated with the B.Sc. degree and thereafter have been in attendance in the Faculty of Applied Science for at least one full session.

The work prescribed consists of two parts, as follows:

A. Research and Thesis representing not less than half the session's work. Except by special permission the thesis must be submitted by April 20. A candidate who is allowed to postpone his thesis must submit it by September 20 if he desires a degree in the fall.

B. One or both of the following which must be cognate to the field of study and tested by examinations:

(i) Prescribed lecture courses. These, except by special permission of the Faculty, must be advanced courses (i.e. courses not offered for the B.Sc. degree). If allowed to take an undergraduate course, the candidate must pass a special examination of a standard higher than is exacted from B.Sc. candidates.

(ii) Directed special studies with reports.

Written examinations are set on the lecture courses prescribed and also on the directed special studies and a minimum standing of 66% must be made on each paper.

An oral examination is given on the subject of the thesis.

Candidates must apply for permission to enter the M.Sc. course at least one week before the opening of the session.

No candidate who makes an average lower than 66% in his final year, or who fails in any of the April examinations of his final year, is accepted for the M.Sc. course except by special recommendation of the Department concerned.

A committee consisting of the Vice-Principal, the Dean, the Head of the Department concerned and the Professor or Instructor, selected to supervise the candidate's work, reports to the Faculty on his fitness to enter the M.Sc. course and recommends to the Faculty the prescribed programme of work. On the recommendation of this committee, the Faculty may decline to accept a candidate with the formal requirement of 66% if because of lack of space, equipment, time or for other reasons the department concerned finds itself unable to conduct the work.

A candidate in full time employment in the University (or elsewhere) is not normally accepted for the M.Sc.

THE INSTITUTION OF CIVIL ENGINEERS OF GREAT BRITAIN

The Council of the Institution of Civil Engineers of Great Britain recognizes the degree of B.Sc. of Queen's University obtained in the departments of Civil, Mechanical and Electrical Engineering as exempting from Sections A and B of the Institution Associate Membership Examination. Graduates in the departments of Mining and Metallurgy are exempt from Section B.

DOMINION LAND SURVEYORS

Revised Statutes Canada Chap. 117, Sec. 22, 1927

Every person who has followed a regular course of study in all the branches of education required for this act for admission as a Dominion Land Surveyor in any college or university where a complete course of theoretical and practical instruction in surveying is organized, and who, after examination, had thereupon received from such college or university a degree attesting to his completion of the said course of instruction, which degree shall be the degree of Bachelor of Science ——— shall be exempt from serving three years as aforesaid as an articled pupil, and shall be entitled to examination for a commission after being admitted upon examination as aforesaid as an articled pupil, and serving one year under articles with a Dominion Land Surveyor including six months' actual service with him in the field. ———

ONTARIO LAND SURVEYORS

Revised Statutes Ontario 1927, Chap. 201, Sec. 28 (1).

The privilege of a shortened term of apprenticeship shall also be accorded to any graduate of the ——— or to any graduate in Civil Engineering or of Mining Engineering ——— of Queen's University at Kingston, and such person shall not be required to pass the preliminary examination for admission to apprenticeship, and shall only be bound to serve under articles with a practicing surveyor, duly filed as required by section 31, during twelve successive months of actual practice after which on complying with all the other requirements he may undergo the examination for admission to practice.

COURSES.

A—Mining Engineering; B—Chemistry; C—Mineralogy and Geology; D—Chemical Engineering; M—Metallurgical Engineering; E—Civil Engineering; F—Mechanical Engineering; G—Electrical Engineering; H—Physics.

First Year, All Courses

	Lect. Hrs. per week.	Lab. Hrs. per week.	Page.
English	2	0	68
Mathematics I.	4	0	70
Mathematics II.	3	0	70
Physics I and II	4	2	72
Chemistry I. (2)*	3	3	78
Drawing I.	0	6	129
Surveying I.	0	2	114
Physical Training	0	2	131
	16	15	Total 31

Second Year

Courses A, B, C, D, M.

Mathematics V.	3	0	70
Descriptive Geometry	0	2	130
Physics XIV	3	2	74
Qualitative Analysis I. (Chem. 10)*	2	6	80
Mineralogy I. (1)*	1a,2b	2	91
Geology I.	2	0	86
General Engineering I.	2	0	106
Surveying II.	1	3	115
Drawing II.	0	3	129
	14a	18a	Total 32a
	15b	18b	Total 33b

* The No. of the same course given in the Faculty of Arts.

Students in Courses A and E must take Surveying Field Work. See p. 115.

a—first term; b—second term.

Courses E, F, G.

	Lect. Hrs. per week.	Lab. Hrs. per week.	Page.
Mathematics V.	3	0	70
Descriptive Geometry	0	2	130
Physics III.	2	2	73
Physics IV.	2	2	74
General Chemistry II.	2	0	79
General Engineering VII	3	0	108
Mechanical Engineering IX.	1	2	124
Surveying II.	1	3	115
Drawing III.	0	3	130
Shop Work	0	2	128
	14a	16a	Total 30a
	14b	16b	Total 30b

Students in Courses A and E must take Surveying Field Work. See p. 115.

A.—MINING ENGINEERING.

This course is necessarily a very broad one, so that it may give a foundation for whatever branch of the profession a graduate may enter. Experience has shown that graduates do not usually follow any narrow differentiation which they make during their course, but are governed by many other factors in the practice of Mining Engineering. These factors are often out of their control, and the wisest plan in a four years' course appears to be, not to specialize, but by a broad training in the final years to obtain a suitable introduction to any branch of the work.

There are, however, certain well known avenues towards professional work, such as a good training and a manipulative skill in drafting, chemical analysis, and surveying. These subjects are essential for almost any professional position in mining and metallurgy, and are therefore perfected as far as is possible while at college.

At the present time there are no summer classes, or summer field work in mining or metallurgy. Under these conditions the student can, usually, obtain practical and remunerative work during four or five months each summer. This work, if in connection with Mining, Metallurgy or Surveying is considered to be more useful as a training than practical work under academic supervision.

Visits are paid to mines and smelters. One trip at least is required of each student, the expense not to be more than twenty-five dollars.

First and Second Years

See Page 51.

Third Year

Before entering the third year in Mining Engineering it is necessary for the student to satisfy the department that he is physically fit for the work he intends to follow. This refers particularly to examination of the chest.

Students intending to take the Optional course in Geology must have passed the Mineralogy and Geology of the second year with an average of 66 per cent.

	Lect. Hrs. per week.	Lab. Hrs. per week		Page.
Surveying Field Work	2 weeks course			115
Quantitative Analysis I. (3)*	1	3		81
Mineralogy IV. (11)*	2	2		93
Geology III. (b) (10b)*	2a	0		87
Geology IV.	2b	2b		86
Mining I.	2	2a,1b		96
Ore Dressing	2a,1b	0		97
Metallurgy II.	2	0		99
Thermodynamics I.	1	0		125
General Engineering III.	0	2		107
General Engineering V.	1	3		107
Electrical Engineering I.	2	2		117
Fire Assaying	0	4b		101
	15a	14a	Total	29a
	14b	19b	Total	33b

Fourth Year

	Lect. Hrs. per week.	Lab. Hrs. per week	Page.
Mechanical Engineering IV.	2	0	122
Geology V.	1	0	87
Geology VIII. (15)*	2	0	88
Hydraulic Engineering IV.	2	0	111
Metallurgy IV.	3	0	99
Milling	0	9	98
Mining II.	4	2	96
Mining III.	0	3	97
Economics I.	2	0	69
Summer Essay			97
	16	14	Total 30

* The No. of the same course given in the Faculty of Arts.

To those students who wish to do further work in Geology the following optional course in the fourth year is offered. Students eligible to take this course must pass the third year with an average of 62% and the Mineralogy and Geology of that year with an average of 66%.

On account of crowded post-war conditions, this course has been temporarily discontinued.

FOURTH YEAR, GEOLOGY OPTION

	Lect. Hrs. per week.	Lab. Hrs. per week.	Page.
Geology II. (11)*	0	2	86
Geology V.	1	0	87
Geology VII.	0	2b	88
Geology VIII. (15)*	2	0	88
Geology X.	0	3a	88
Geology XI.	0	3b	89
Mineralogy II. (10b)*	2b	2b	92
Mineralogy VI. (14a)*	1a	2a	94
Mining II.	4	0	96
Metallurgy IV.	3	0	99
Hydraulic Engineering IV.	2	0	111
Mechanical Engineering IV.	2	0	122
Economics I.	2	0	69
Summer Essay			97
	17a	7a	Total 24a
	18b	9b	Total 27b

* The No. of the same course given in the Faculty of Arts.

B.—CHEMISTRY (Industrial and Research)

The object of this course is to fit students to enter on graduation upon the practice of the profession of chemistry whether it be exercised in the analytical chemical laboratory, the research laboratory or in the operation and control of chemical industries or other industries in which chemistry plays an important role. It comprises instruction in the principal branches of chemistry as well as fundamental training in mathematics, physics and other closely related sciences. The course is identical in the first two years with that in mining, metallurgical and chemical engineering. In the third year more intensified study of chemistry begins and is continued and developed in the fourth year. In the latter year by the assignment to each student of a minor research problem training is given in methods of research, independent study and the use of the library for investigational work.

FIRST AND SECOND YEARS—See page 51.

THIRD YEAR	Lect. Hrs. per week.	Lab. Hrs. per week	Page.
Quantitative Analysis II. (13)*	2	6a,10b	82
Industrial Chemistry II. (17)*	2	3	83
Physical Chemistry I. (14)*	2	3	82
Organic Chemistry I. (12)*	2	3	80

General Chemistry III.	2	0	79
Metallurgy II.	2	0	99
Mineralogy III. (10a)*	2a	2a	92
German I.	3	0	68
	17a	17a	Total 34a
	15b	19b	Total 34b

Fourth Year	Lect. Hrs. per week.	Lab. Hrs. per week	Page.
Organic Chemistry II. (22)*	2	6	81
Physical Chemistry II. (25)*	2	3	82
Physical Chemistry III. (24)*	2	3	83
Industrial Chemistry IIIa.	2a	3a	84
Colloid Chemistry II.	2a,3b	2a	84
Economics I.	2	0	69
German II.	2	0	69
Option in Chemistry			
General and Inorganic Chemistry IV, Organic Chemistry IV, Quantitative Analysis IV, Physical Chemistry IV or Industrial Chemistry IV.	0	9b	79-84
	14a	17a	Total 31a
	13b	21b	Total 34b

* The No. of the same course given in the Faculty of Arts.

C.—MINERALOGY AND GEOLOGY

This course furnishes a foundation for those looking forward to any of the professions connected with the discovery and development of mineral deposits and the utilization of minerals. It forms a worth while additional year of study for graduates in mining engineering who plan to undertake the early stages of mine development rather than the operation of established mines. It gives the student intending to become a geologist or mineralogist those fundamental courses needed for post-graduate study, but at the same time it is comprehensive enough to allow graduates to undertake geological and mineralogical investigations without post-graduate study.

The departments of Mineralogy and Geology have well equipped laboratories both for the elementary study of minerals and rocks and for advanced research. These include a large laboratory for elementary investigation of minerals, a petrographic laboratory and smaller laboratories for invesigation of minerals by means of x-rays, for thermal experiments, for chemical investigations and for the preparation and microscopic study of ores, minerals and rocks.

Large collections of rocks and minerals are on exhibition in the museum on the ground floor of Miller Hall and large numbers of specimens are available for study in other collections.

Excursions to the many localities of mineralogical and geological interest near Kingston are made during the fall term. Students are urged to spend the summer vacations in field work especially in work that will supplement and illustrate the theoretical work of the session.

First and Second Years

See Page 51.

Third Year

	Lect. Hrs. per week.	Lab. Hrs. per week	Page.
Quantitative Chemistry I. (3)*	1	3	81
Physical Chemistry I. (14)*	2	3	82
Mineralogy II. (10b)*	2b	2b	92
Mineralogy III. (10a)*	2a	2a	92
Mineralogy IV. (11)*	2	2	93
Geology II. (11)*	2	2	86
Geology III. (10b)*	2b	2b	86
Geology VII.	0	2b	88
Geology X. (17)*	0	4a	88
Geology XI.	0	4b	90
Ore Dressing	2a,1b	0	97
	11a	16a	Total 27a
	12b	20b	Total 32b

Fourth Year

	Lect. Hrs. per week.	Lab. Hrs. per week	Page.
Mineralogy V. (12)*	2	2	93
Mineralogy VI. (14a)*	1a	2a	94
Geology V.	1	0	87
Geology VI. (13)*	2	2	87
Geology VIII. (15)*	2	0	88
Geology XII. (14a)*	2a	2a	89
Reports	0	4	89
Mining IV.	1	0	97
Economics I.	2	0	69
Research and Thesis	0	3a,6b	94
German 1.	3	0	68
	16a	15a	Total 31a
	13b	17b	Total 30b

Graduates in Course A or Course C who wish to take further work in Geology and Mineralogy are referred to the graduate courses in Geology, p. 65, and in Mineralogy, p. 95.

D—CHEMICAL ENGINEERING

Chemical Engineering is the application of the fundamental principles of Physics, Chemistry, Engineering, and Physical Chemistry, to the construction and operation of Chemical plant. The course must therefore be a broad one and avoid too narrow a specialization. Graduates have been found to enter the most diverse industries.

The first two years are the same as those for the Mining, Metallurgy and Chemistry students. Specialization begins in the third year, more time being devoted to Chemistry, whilst continuing fundamental courses in Mechanical, Civil and Electrical Engineering. Specialization is continued in the fourth year, with additional training in Chemical Engineering, Mechanical Engineering and Applied Thermodynamics.

The course aims at training students for research and operating positions in chemical and allied industries.

Visits are paid to local chemical works and to a number of the largest chemical plants outside of Kingston, attendance being compulsory. The expense of the outside trip in the fourth year does not exceed thirty dollars.

First and Second Years

See Page 51.

Third Year

	Lect. Hrs. per week.	Lab. Hrs per week.	Page.
Quantitative Chemistry I. (3)*	1	3	81
Physical Chemistry I. (14)*	2	3	82
Industrial Chemistry II. (17)*	2	3a,2b	102
Chemical Engineering I.	2b	0	103
Organic Chemistry I. (12)*	2	3	80
Thermodynamics I.	1	0	125
General Engineering III.	0	2	107
General Engineering V.	1	3	107
Electrical Engineering I.	2	2	117
Mechanical Engineering XII.	1	3b	125
	12a	19a	Total 31a
	14b	21b	Total 35b

FOURTH YEAR

	Lect. Hrs. per week.	Lab. Hrs. per week.	Page.
Physical Chemistry II. (25)*	2	3	82
Colloid Chemistry Ia. (15a)*	2a	2a	84
Chemical Engineering II.	2	3	103
Chemical Engineering III.	2	5a,7b	104
Chemical Engineering IV (Metallurgy I)	1	0	105
Chemical Engineering V.	2	0	105
Thermodynamics II	2	3a	126
Hydraulic Engineering IV.	2	0	111
Shop Work	0	3b	128
Economics I.	2	0	69
	17a	16a	Total 33a
	15b	16b	Total 31b

* The No. of the same course given in the Faculty of Arts.

M—METALLURGICAL ENGINEERING

Metallurgy is divided into chemical metallurgy, the extraction of the metals from their ores and the refining of the metals, and physical metallurgy, the use of the metals and their alloys in the industries. The former requires in students a grounding in inorganic chemistry and its application in metallurgical processes; the latter, a grounding in physics and its application in the study of the constitution of alloys and their physical changes.

The first two years of the course are the same as those in Mining Engineering, Chemical Engineering and Chemistry. The engineering aspect of metallurgical work is to the fore in these preparatory years, and is kept in view during the third and fourth years.

In the third year specialization begins and particular stress is placed on inorganic and physical chemistry and chemical metallurgy. In the fourth year these are continued, while a foundation is laid in physical metallurgy in lecture room and well equipped laboratories.

As far as industrial conditions permit, students are required to work in mills or smelters during their summer vacations. For graduation an essay on some phase of this practical experience is demanded.

First and Second Years

See Page 51.

Third Year

	Lect. Hrs. per week.	Lab. Hrs. per week.	Page.
Quantitative Analysis I. (3)*	1	3	81
Physical Chemistry I. (14)*	2	3	82
Organic Chemistry V.	1	0	80
Thermodynamics I.	1	0	125
Mineralogy VIIa.	2a	0	94
General Engineering III.	0	2	107
General Engineering V.	1	3	107
Electrical Engineering I.	2	2	117
Mechanical Engineering XII.	1	3b	125
Metallurgy II.	2	0	99
Metallurgy III.	2	0	99
Ore Dressing	2a,1b	0	97
Fire Assaying	0	4a	101
	17a	17a	Total 34a
	14b	16b	Total 30b

Fourth Year

	Lect. Hrs. per week.	Lab. Hrs. per week.	Page.
Physical Chemistry II. (25)*	2	3	82
Mining IV.	1	0	97
Metallurgy IV.	3	0	99
Metallurgy V.	1	0	100
Metallurgy VI.	1b	0	100
Metallurgy VII.	0	2	100
Metallurgy Lab.	0	3	111
Metallography I.	1a	3a	100
Metallography II.	1b	3b	100
Hydraulic Engineering IV.	2	0	111
Milling	0	9	98
Economics I.	2	0	69
Summer Essay	..	..	101
Mineralogy VIa. optional (14a)*	1a	2a	94
	12a	20a	Total 32a
	13b	20b	Total 33b

* The No. of the same course given in the Faculty of Arts.

E.—CIVIL ENGINEERING.

The Course in Civil Engineering proceeds from the fundamentals—Mathematics, Physics, Mechanics, Surveying and Draughting — to their application in—Structural, Sanitary, Highway and Hydraulics—which make up the general field of Civil Engineering.

Throughout the Course specially adapted classes in Metallurgy, Geology, Chemistry, Electrical and Mechanical Engineering are added. Attention is given particularly to Economics and English.

First and Second Years

See Pages 51 and 52.

Third Year

	Lect. Hrs. per week.	Lab. Hrs. per week	Page.
Surveying Field Work	2 weeks course		115
Metallurgy I.	1	0	99
Thermodynamics I.	1	0	125
General Engineering II.	2a,1b	2	106
General Engineering III.	0	1	107
Structural Engineering I.	2	3	108
Hydraulic Engineering I.	2	0	110
Municipal & Sanitary Engineering I.	1	2	111
Electrical Engineering I.	2	2	117
Geology IX.	2	0	83
Highway Engineering and Foundations	1	3	113
Surveying and Railroad Engineering	1	3	115
	15a	16a	31a
	14b	16b	30b

FOURTH YEAR

	Lect. Hrs. per week.	Lab. Hrs. per week.		Page.
General Engineering IV.	0	3a		107
Municipal and Sanitary Engineering II.	1	0		112
Municipal and Sanitary Engineering III.	1	3b		112
Highway Engineering	1	3a		114
Structural Engineering II.	2	5a,6b		109
Structural Engineering IV.	2a,1b	5		109
Mechanical Engineering IV.	2	0		122
Hydraulic Engineering II.	2	0		110
Hydraulic Engineering III.	0	3b		110
Economics I.	2	0		69
Engineering Relations	1	0		111
Thesis	1	0		116
	15a	16a	Total	31a
	14b	17b	Total	31b

F.—MECHANICAL ENGINEERING.

Mechanical Engineering embraces the design, manufacture and operation of all classes of machinery, of power plants and manufacturing plants, as well as the executive management of industries. A four years' course must therefore be broad enough to give the student a thorough training in the fundamental principles, and not merely provide training for one of the many special branches of the profession.

The first two years are devoted to the study of the fundamental subjects of Mathematics, Physics, Chemistry and Mechanics, including experimental work in the various laboratories. Special attention is given to the strength of materials, with practice in testing during the second and third years. The third and fourth year courses include theoretical and applied Thermodynamics, the study of reciprocating steam engines, with their valve gears, governors, etc., the study of steam turbines, and the engineering and economics of steam power-plant design. Courses are also included on Internal Combustion Engines, on Air Compression, Refrigeration and Heating. Instruction is also given in Mechanism, Machine Design, Production Engineering, Shop Work, and the fundamental principles of Electrical Engineering.

Instruction in drawing extends over the four years, and gives a thorough drill in modern drafting-room practice. In the more advanced courses of the fourth year the student is taught how to apply the general principles to the design and operation of special machinery, steam and gas engines, steam boilers, and complete power plants; each student is allowed to specialize as far as is practicable. The instruction in the laboratories is intended not only to familiarize the student with standard methods of testing, but also to teach him how to attack original problems.

The third of fourth year students are kept in touch with manufacturing works through the student branch of the A.S.M.E. in order to familiarize them with the practice of modern power plants and shops.

The new Mechanical Engineering Building, McLaughlin Hall, will be ready for class room work by the fall of 1947. This building will contain modern class room and draughting room facilities in addition to the Thermodynamics laboratories and the machine and welding shops. The laboratories will include the following equipment:

Internal Combustion Engines, Heating, Ventilating and Air Conditioning, Air Compressors, Refrigerators, Heat Transfer Apparatus, Flow and Pumping Equipment; Fuel, Oil and Boiler Water test equipment; modern Machine and Welding Shops.

The Steam Engine Laboratory will remain at the Central Heating Plant.

First and Second Years

See Pages 51 and 52.

Third Year

	Lect. Hrs. per week.	Lab. Hrs. per week.		Page.
Thermodynamics I.	1	1		125
Thermodynamics V.	4a,2b	2		127
General Engineering III.	0	1		107
General Engineering V.	1	3		107
Electrical Engineering IV.	2	2		118
Metallurgy I.	1	0		99
Mechanical Engineering I.	2	0		121
Mechanical Engineering II.	3b	0		122
Mechanical Engineering III.	3	3		122
Shop Work	0	3		128
Hydraulic Engineering I.	2	0		110
	16a	15a	Total	31a
	17b	15b	Total	32b

Fourth Year

Thermodynamics III.	2	0		126
Thermodynamics IV.	1b	6a.3b		126
Electrical Engineering VII.	2	2		119
Mechanical Engineering V.	3	6a.3b		123
Mechanical Engineering VI.	2a,1b	0		123
Mechanical Engineering VIII.	0	3		124
Mechanical Engineering X.	2	0		124
Mechanical Engineering XI.	2	0		125
Hydraulic Engineering II.	2	0		110
Hydraulic Engineering III.	0	3b		110
Metallurgy VIII.	0	2a		100
Economics I.	2	0		69
	17a	19a	Total	36a
	17b	14b	Total	31b

G.—ELECTRICAL ENGINEERING

The instruction in the first two years of the course in Electrical Engineering provides for a thorough training in the fundamental subjects of Mathematics, Physics, Chemistry and Mechanics, including suitable work in the various laboratories. Part of the time is devoted to elementary drawing and shop work. In the third year the work consists of an introduction to the general principles underlying all electrical work together with elementary laboratory work. Considerable time is devoted to the study of Thermodynamics together with more advanced Mathematics and Physics. The fourth year is devoted to the study of the theory and action of the main types of electrical apparatus, the design and operation of central stations, electric lighting, electric railways and power transmission together with a thorough grounding in the principles underlying the electron tube.

An important part of the course consists in solving problems such as are frequently met with in practical work. In this way the student is trained in the application of theory to the solution of practical problems.

Arrangements are made for occasional visits to electrical works.

The whole course is designed to give the student a thorough understanding of the general principles which constitute the basis of all electrical work, together with some knowledge of their practical application. No effort is made to give that intimate knowledge of practical details which experience alone can supply.

Students are advised not to enter Course G unless they have taken a high standing in Physics III, Physics IV, and Mathematics V.

First and Second Years

See Pages 51 and 52.

Third Year

	Lect. Hrs. per week.	Lab. Hrs. per week.	Page.
Mathematics VII.	2	0	71
*Physics V.	2a,1b	2b	75
Thermodynamics I.	1	0	125
General Engineering III.	0	2	107
*Electrical Engineering II.	2a,3b	3	118
*Electrical Engineering III.	3a,2b	3	118
Electrical Engineering VI.	2a	2b	119
Mechanical Engineering I.	2	0	121
Mechanical Engineering II.	2b	0	122
Mechanical Engineering VII.	0	3	124
Metallurgy I.	1	0	99
Hydraulic Engineering I.	2	0	110
	17a	11a	Total 28a
	16b	15b	Total 31b

*Students must pass these subjects before entering the fourth year.

Fourth Year

	Lect. Hrs. per week.	Lab. Hrs. per week.		Page.
Electrical Engineering V.	4	6		119
Electrical Engineering VIII.	1	3		119
Electrical Engineering IX.	2	3		120
Electrical Engineering X.	1	3		120
Electrical Engineering XI.	1	3		120
Electrical Engineering XII.	2	3		120
Hydraulic Engineering II.	2	0		110
Hydraulic Engineering III.	0	3a		110
Mechanical Engineering IV.	2	0		122
Metallurgy VI.	1b	0		100
Economics I.	2	0		69
	14a	18a	Total	32a
	15b	15b	Total	30b

Power option students must take Electrical Engineering IX and X.

Communication option students must take Electrical Engineering XI and XII.

H.—PHYSICS

This course is designed to fit men for positions as physicists in research laboratories and industries.

The importance of a thorough grounding in the fundamental subjects of Physics, Mathematics, and Chemistry, cannot be over-emphasized, so these subjects form the major part of the course. The engineer's point of view is acquired from the classes of the Faculty of Applied Science, while the breadth of view necessary for a research worker is gained from the advanced theoretical classes in the major subjects of the course.

Before registering in this course students should consult with the head of the department of Physics, preferably at the end of their second year.

Students who are in the group ABCDM and wish to enter course H must pass with satisfactory standing the September examinations in Physics III and Physics IV.

First Year

See Page 51.

Second Year

The Second Year of Any Course

Third Year

	Lect. Hrs. per week.	Lab. Hrs. per week.		Page
Mathematics VII.	2	0		71
Mathematics VIII. (19)	3	0		71
Physics V.	2a,1b	2b		75
Physics VI. (10b)*	3b	2b		75
Physics VII. (14a)*	3a	2a		75
Physics VIII. (13b)*	3b	2b		76
Electrical Engineering II.	2a,3b	3		118
Electrical Engineering VI.	2a	2b		119
German I.	3	0		68
	17a	5a	Total	22a
	18b	11b	Total	29b

Fourth Year

Mathematics X. (22)*	3	0		71
Physics IX. (16a)*	3a	0		76
Physics X. (21a)*	3a	0		76
Physics XI. (20b)*	3b	0		76
Physics XII. (17b)*	2b	0		77
Physics XIII.	0	6		77
Electrical Engineering VIII.	1	3		119
Electrical Engineering XI.	1	3		120
Electrical Engineering XII.	2	3		120
German II or French	2	0		69
	15a	15a	Total	30a
	14b	15b	Total	29b

GRADUATE COURSE IN GEOLOGY

The establishment of the Miller Memorial Research Chair in Geology has made it possible to give graduate work in Geology.

The courses are planned to give to those men who have graduated in Course C, Mineralogy and Geology, or Mining Engineering, Geology option, the additional training in Geology that is needed for those who intend to become professional geologists or undertake exploration and development work.

For those who intend to make Geology their profession a year's work satisfactorily completed at Queen's is equivalent to a year's graduate work at other universities and is accepted as such at most of the important graduate schools in Geology. It has the advantage of giving to graduates who intend to practice their profession in Canada an opportunity to study Canadian localities and problems in more detail than is otherwise possible since the collections of material from the important mineral deposits of the Canadian shield are large and fairly complete, and there is also in the vicinity of Kingston the opportunity for field study of Pre-Cambrian rocks.

Graduates in courses A, Geology option, and C in the Faculty of Applied Science at Queen's University and graduates in equivalent courses of other universities may proceed to the M.Sc. degree. (See p. 49) The courses are open only to graduates.

For outline of courses see page 90.

COMBINED COURSE IN ARTS AND APPLIED SCIENCE, A COURSE LEADING TO THE DEGREES OF B.A. AND B.Sc. IN SIX YEARS

Students taking this Course are required to have full standing for admission to the Faculty of Arts. They pay full Arts fees for the first two years. In the third and fourth years they register in both Arts and Applied Science but pay fees in Applied Science only. They register in the fifth and sixth years in the Faculty of Applied Science and pay fees in the Faculty of Applied Science.

The Arts regulation governing back classes applies for the first three years,—(see regulation 15, page 82 of the Arts calendar). Students with back classes in Arts are not permitted to make up these classes while they are registered in the Faculty of Applied Science.

The courses must be taken in the order in which they are outlined in the calendar.

The degree of Bachelor of Arts is conferred on candidates who complete four years' work as outlined below, with a minimum standing of fifty percent. and sixty-two per cent. in half the classes.

First Year

English 2.

Philosophy 1.

One language course in addition to English 2 (course numbered 1 or 2 depending on the entrance standing in the language chosen. For example, candidates entering with Grade XII standing in French or German take French 1 or German 1; those entering with Grade XIII standing in French or German take French 2 or German 2).

Mathematics I (Applied Science).

Physics II (Applied Science).

Second Year

Three courses in Arts to be selected from courses which are not covered later in Applied Science.

Chemistry I (Applied Science).

Mathematics II (Applied Science).

Third Year

A course in History or Economics or Politics.

Two courses in Arts to be selected from courses which are not covered later in Applied Science.

Physics I (Applied Science).

Drawing (Applied Science).

Surveying (Applied Science).

Fourth Year

The regular second year Science programme. The work of this year includes courses in Mathematics, Physics and Chemistry which are counted towards a degree in Arts.

Fifth and Sixth Years

The fifth and sixth years are the same as the third and fourth years of the Course leading to the degree of Bachelor of Science.

SUBJECTS OF STUDY

ENGLISH

LECTURER—E. ALASTAIR WALKER, M.A.

LECTURER—JOHN G. L. PEARSON, Ph.D.

INSTRUCTOR—L. ELIZABETH MACLEAN, M.A.

FIRST YEAR ENGLISH

The course consists of composition, including report writing, public speaking, semantics, and the study of prescribed texts by the following authors: Lewis, Shaw, Galsworthy, and Hayakawa.

Norman Foerster and J. M. Steadman, *Writing and Thinking* (Boston: Houghton and Mifflin, 1941); Sharon Brown, ed. *Present Tense* (New York: Harcourt, Brace and Co., 1945); H. W. Fowler, *The Concise Oxford Dictionary* (Oxford: The Clarendon Press).

Lectures— Section 1 (A and B), *Monday,* 8-9 and *Thursday,* 3.30-4.30; Section 2 (A and B), *Tuesday* and *Friday,* 8-9; Section 3 (A and B), *Monday,* 1.30-2.30 and *Wednesday,* 8-9; Section 4, (A and B), *Tuesday,* 11-12 and *Thursday,* 9-10; Section 5 (A), *Monday,* 11-12 and *Thursday,* 2.30-3.30; Section 5 (B), *Monday,* 10-11 and *Thursday,* 1.30-2.30; Section 6 (A and B), *Tuesday,* 1.30-2.30 and *Thursday,* 11-12; Section 7 (A and B), *Wednesday,* 11-12 and *Friday,* 1.30-2.30; Section 8 (A and B), *Wednesday* 2.30-3.30 and *Friday,* 10-11.

GERMAN

PROFESSOR—HEINRICH HENEL, Ph.D.

GERMAN I

For third year students in Courses B and H, and fourth year students in Course C.

This course is intended to meet the needs of students who enter the University with little or no knowledge of German. The work comprises a study of elementary German grammar and the reading of easy scientific literature.

Text-books—Hagboldt and Kaufmann, *A Brief Course in German* (Heath); Wild, *An Introduction to Scientific German* (Oxford).

Lectures—Monday and *Wednesday,* 4.30-5.30; *Friday,* 9-10.

Professor Henel.

GERMAN II

For fourth year students in Courses B and H or any Science students.

This course is designed for students who are doing advanced work in chemistry, physics, geology and mineralogy. Prerequisite: Matriculation in German, German A (Arts), or German I.

Text-books—Curts, *Einführung in die Chemie* (Holt); Curts, *Readings in Scientific and Technical German* (Holt); Patterson, *German-English Dictionary for Chemists* (Wiley).

Lectures—Tuesday and Thursday at 9.

Professor Henel.

ECONOMICS

Economics I.

Professor—J. C. Cameron, M. Com., (Head of the Department of Industrial Relations).

Required of fourth year students in Courses A, B, C, D, M, E, F, and G.

This is a business-background course for engineers. The main emphasis is on personnel management and industrial relations.

Assigned Readings.

Lectures—Monday and Wednesday, 9-10, (a).

Professor Cameron.

During the second term, talks by outside speakers are given on various topics related to the engineering profession and Canadian industry.

The lecturers are men outstanding in their own fields, who can speak with authority on the opportunities and responsibilities of the young engineer.

Lectures—Monday and *Wednesday*, 9-10 (b).

MATHEMATICS.

The N. F. Dupuis Professor of Mathematics—R. L. Jeffery, M.A., Ph.D., F.R.S.C.

Professor—N. Miller, M.A., Ph.D.

Associate Professor—I. Halperin, M.A., Ph.D.

Associate Professor—G. L. Edgett, M.A., Ph.D.

Associate Professor—F. M. Wood, M.A., B.Sc.

Lecturers—N. S. Mendelsohn, M.A., Ph.D., J. F. Twiss, M.A.

Assistants—A. F. Holloway, B.Sc., J. E. Nelson, B.Sc., D. C. Stirling, B.Sc., C. N. Rowse, B.A., B. Paed. (Tor.).

An essential part of the student's training in all courses in Mathematics is the training in accurate computation. He should cultivate the habit of care and accuracy in all his numerical work.

MATHEMATICS I

For all first year students.

Topics in Algebra, Plane and Spherical Trigonometry, and Solid Mensuration.

Text Books—Rosenbach and Whitman, *College Algebra* (Ginn); Kern and Bland, *Solid Mensuration.*

Sections 1-2, *Tuesday* and *Thursday,* 1.30-3.30;

Sections 3-4, *Tuesday,* 9-11, *Thursday,* 1.30-3.30;

Section 5, *Tuesday,* 9-11, *Friday,* 3.30-4.30, *Saturday,* 10-11;

Section 6, *Tuesday,* 10-12, *Friday,* 3.30-4.30, *Saturday,* 10-11;

Section 7, *Thursday,* 9-11, *Saturday,* 10-12.

Section 8, *Tuesday* and *Thursday,* 10-12.

Professor Wood, Dr. Mendelsohn, Messrs. Twiss, Holloway, Nelson and Stirling.

MATHEMATICS II

For all first year students.

Calculus and Analytic Geometry.

Text Book—Middlemiss, *Differential and Integral Calculus* (McGraw-Hill).

Sections 1-2, *Monday, Wednesday,* and *Friday,* 10-11;

Sections 3-4, *Monday, Wednesday* and *Friday,* 3.30-4.30;

Sections 5-6, *Monday, Wednesday,* and *Friday,* 1.30-2.30;

Section 7, *Tuesday* and *Friday,* 11-12, *Wednesday,* 1.30-2.30;

Section 8, *Monday* and *Wednesday,* 10-11, *Friday,* 11-12.

Professor Miller, Messrs. Twiss, Nelson, Rowse, and Stirling.

MATHEMATICS V.

For second year students in all courses.

Calculus. This course continues the Calculus of Mathematics II.

Text Book—Middlemiss, *Calculus* (McGraw-Hill).

ABCDM—Section 1, *Monday* and *Wednesday,* 11-12, and *Friday,* 9-10; Section 2, *Monday, Wednesday* and *Friday,* 11-12; EFG, Sections 1-4, *Monday* and *Friday,* 11-12, *Tuesday,* 8-9; Sections 5-8, *Monday* and *Friday,* 8-9, *Wednesday,* 11-12.

Professor Wood, Dr. Mendelsohn, Mr. Holloway and Mr. Nelson.

MATHEMATICS VII.

For third year students in courses G and H.

A course in ordinary and partial differential equations, including the use of Fourier series and complex variables. Applications to problems in electric circuit theory.

Wednesday and Friday, 10-11.

Professor Miller.

MATHEMATICS VIII.

For third year students in course H.

A course in Advanced Calculus.

Text Book—Woods, *Advanced Calculus* (Ginn).

Tuesday, Thursday, and *Saturday,* 8-9.

Professor Miller.

MATHEMATICS X.

For fourth year students in course H.

Theory of Functions of a Complex Variable, with physical applications.

Monday, Wednesday and *Friday,* 9-10.

Professor Jeffery and Professor Wood.

PHYSICS

EMERITUS PROFESSOR—A. L. Clark, B.Sc., Ph.D., F.R.S.C.

PROFESSOR—J. K. Robertson, M.A., F.R.S.C.

THE CHOWN RESEARCH PROFESSOR—J. A. Gray, O.B.E., B.Sc., D.Sc., F.R.S, F.R.S.C.

PROFESSOR—E. Flammer, B.Sc., Ph.D.

ASSOCIATE PROFESSORS—E. E. Watson, M.Sc., Ph.D.; H. W. Harkness, B.Sc., B.A., M.Sc., Ph.D.; H. M. Cave, M.A., Ph.D.

ASSISTANT PROFESSORS—J. V. Hughes, A.R.C.S., B.Sc., D.I.C., Ph.D., F.Inst.P.; J. R. Bristow, B.Sc., Ph.D., F.Inst.P.

INSTRUCTOR—J. I. Lodge, B.A.

DEMONSTRATORS—R. W. Stewart, B.Sc.; J. M. D. Gibson, B.Sc.; G. Keyser, B.Sc.; A. B. Lillie, B.Sc.; L. H. Lowther, B.Sc.; W. J. Major, B.Sc.; G. N. Whyte, B.Sc.; G. B. Asselstine; W. J. Forsyth.

The work in Physics is carried on in lecture and laboratory courses which run parallel to each other. In the lecture room the fundamental principles are developed and applied, experimental demonstrations given and many problems solved. In all classes in Physics weekly exercises are required of students. In the laboratory a large number of experiments are performed. These are designed to train the student in manipulation of apparatus and instruments of precision, to teach him to make accurate measurements and to give practice in properly recording, interpreting and reducing experimental data.

In all the courses in Physics, the work in the laboratories will be counted as a certain percentage of the whole work of the session. In estimating the standing in the laboratory work, both the quantity and quality of the work done will be considered.

Physics I and II, together forming a complete introductory course, are taken by all first year students. The laboratory work of this year is arranged to supplement the lectures in both Physics I and II. Students work in the laboratory fortnightly and on the intervening fortnightly periods they do assigned problems under supervision. Credit for the work in the laboratory and in these problem periods is given on the written papers in both subjects. Students in both classes have opportunity for assistance by Douglas Tutors, (See page 41).

PHYSICS I.

Required of all first year students.

Mechanics, Properties of Matter.

Lectures—Sections 1-2, *Monday,* 11-12, *Wednesday,* 8-9.

—Sections 3-4, *Monday* 8-9, *Thursday* 3.30-4.30;

—Sections 5-6, *Monday,* 2.30-3.30, *Thursday,* 8-9.

—Sections 7-8, *Monday,* 1.30-2.30, *Wednesday,* 9-10.

Professor Watson, Professor Harkness, Professor Cave and Professor Bristow.

PHYSICS II.

Required of all first year students.

A course of lectures of two hours per week on Magnetism, Electricity, Wave Motion, Sound, and Light. These topics are discussed mathematically and illustrated by experiments.

Lectures—Sections 1-2, *Wednesday* 11-12, and *Friday* 11-12;
Sections 3-4, *Wednesday,* 1.30-2.30, and *Monday,* 4.30-5.30.
Sections 5-6, *Monday* 3.30-4.30 and *Friday,* 2.30-3.30;
Sections 7-8, *Tuesday,* 4.30-5.30 and *Wednesday* 3.30-4.30.

Professor Robertson, Professor Cave, Professor Bristow and Professor Hughes

Laboratory—Section 1, *Monday,* 1.30-3.30;
Section 2, *Monday,* 3.30-5.30;
Section 3, *Thursday,* 8-10;
Section 4, *Thursday,* 10-12;
Section 5, *Monday,* 8-10;
Section 6, *Monday,* 10-12;
Section 7, *Thursday,* 1.30-3.30;
Section 8, *Thursday,* 3.30-5.30.

PHYSICS III.

This class is required of students in the second year in courses E, F, and G.

This course of lectures is a continuation of Physics I. A general review of the important fundamental principles of Physics occupies the first few weeks. These are then applied to Problems dealing with Static Elasticity, Motion in a Circle, Rotation of a Rigid Body, General Plane Motion of a Rigid Body, Simple Harmonic Motion, Special Rigid Body Motion, Friction of Belts, Pivots and Bearings, Bernoulli's Equation, Viscosity, Heat Conduction, Work in Gaseous Expansion, Energy Transformations.

Students work in the laboratory fortnightly and during the intervening fortnightly periods work assigned problems under supervision.

Lectures—Sections 1-4, *Monday* 9-10 and *Friday* 8-9;
Sections 5-8, *Tuesday* 9-10 and *Thursday* 9-10.

Professor Harkness, Professor Bristow.

Laboratory—Sections 1-2, *Friday,* 1.30-3.30;
Sections 3-4, *Friday,* 3.30-5.30;
Sections 5-6, *Wednesday* 1.30-3.30;
Sections 7-8, *Wednesday* 3.30-5.30.

Professor Harkness, Professor Bristow, Mr. Major and Mr. Asselstine

PHYSICS IV.

This class which is required of students in the second year in Courses E, F, G, consists of (a) two lectures per week, (b) a laboratory course of two hours per week.

In the lectures, fundamental electrical ideas are discussed, with special emphasis on quantitative relations. Problems are assigned weekly dealing with basic ideas of Electrostatics, Magnetism, Electromagnetism, Electrodynamics, Electromagnetic Induction, and Alternating Currents.

The laboratory course includes a series of experiments designed to train the student in standard electrical measurements, as well as to illustrate work discussed in lectures.

Lectures—Sections 1-4, *Wednesday* 8-9 and *Friday* 9-10;

Sections 5-8, *Tuesday* 8-9 and *Thursday* 11-12.

Professor Watson, Professor Hughes.

Laboratory—Sections 1-2, *Thursday* 1.30-3.30;

Sections 3-4, *Monday* 3.30-5.30;

Sections 5-6, *Monday* 1.30-3.30;

Sections 7-8, *Thursday* 3.30-5.30.

Professor Watson, Professor Hughes, Professor Cave, Mr. Forsyth, Mr. Gibson and Mr. Major.

PHYSICS XIV.

This class is required of students in the second year in courses A, B, C, D, M. There are three lectures and two laboratory hours per week.

The work comprises much of the work of Physics III and parts of Physics IV. Approximately two-thirds of the time is given to Mechanics and one-third to Electricity and Magnetism.

Lectures—Monday 10-11; *Tuesday* 10-11; *Wednesday* 9-10.

Professor Hughes.

Laboratory—Section 1, *Tuesday,* 3.30-5.30;

Section 2, *Saturday* 8-10.

Professor Hughes, Mr. Lodge and Mr. Forsyth.

PHYSICS V.

Required of students in third year of Courses G and H.

The work of this class comprises a course of lectures on the Elementary Mathematical Theory of Electricity and Magnetism, and a course of laboratory experiments in advanced electrical measurement.

In the lectures are treated such topics as the more important laws and theories in Electrostatics, the laws of the Magnetic Field, Electrodynamics and Electromagnetic Induction. At each lecture problems are assigned for solution and these are later discussed in class.

In the laboratory the students make detailed study of several groups of experiments. These comprise careful study of galvanometers using both steady and transient currents, measurements of capacities, permeability, insulation resistance, and self and mutual inductance, the use of the potentiometer in measurement of electro-motive force of cells, calibration of voltmeters and ammeters, and study of electrical waves and discharge phenomena.

Lecture—Wednesday, 2.30-3.30, and *Thursday,* 9-10, first term.
Thursday, 9-10, second term.

Laboratory—Friday, Section 1, 1.30-3.30; Section 2, 3.30-5.30, second term.

Professor Flammer, Professor Harkness, Mr. Stewart and Mr. Lillie.

PHYSICS VI.

Elementary Theoretical Mechanics.

Required of students in third year of Course H.

This course consists of a series of lectures in which the elements of Statics and Dynamics of a Particle are discussed.

Lectures—Tuesday, Thursday and *Saturday,* 10-11, second term.

Laboratory—Monday, 1.30-3.30, second term.

Professor Cave.

PHYSICS VII.

Required of students in third year of Course H.

HEAT. This course is an introduction to Thermodynamics, beginning with a detailed discussion of the isothermal and the basis of thermometry and continuing with the development of the laws of Thermodynamics and a discussion of entropy, its properties and applications.

Lectures—Monday, Wednesday, and Friday, 11-12, first term.

Laboratory—Thursday, 1.30-3.30, first term.

Professor Harkness, Professor Bristow.

PHYSICS VIII.

Required of students in third year of Course H.

ELECTRICITY. The general aim of this course is to acquaint the student with the modern developments in such branches of Physics as Radiation, X-rays, Conduction of Electricity through Gases, Radioactivity, etc.

Text Book—Crowther, *Ions, Electrons and Ionizing Radiations.*

Lectures—Monday, Wednesday and *Friday,* 11-12, second term.

Laboratory—Thursday, 1.30-3.30, second term.

Professor Gray, Professor Cave and Professor Bristow.

PHYSICS IX.

Required of students in fourth year of Course H.

MECHANICS OF RIGID AND ELASTIC BODIES. This course includes a discussion of such topics as the Motion of a Rigid Body, Ellipsoids of Inertia, Motion with Fixed Axis and Fixed Point, Euler's Equations, and applications to motion of the symmetrical top; Stress and Strain relations in Elastic Bodies, Elastic Constants.

Lectures—Monday, Wednesday, and Friday, 11-12, first term.

Professor Flammer.

PHYSICS X.

Required of students in fourth year of Course H.

KINETIC THEORY OF GASES. This course includes the topics of the Maxwellian distribution of velocities, free path phenomena, viscosity, thermal conductivity, diffusion, Van der Waal's equation, and the quantum theory as applied to specific heats and to radiation.

Text Book—Bloch, *Kinetic Theory of Gases.*

Lectures—Tuesday, 10-11, *Thursday,* 11-12, *and Friday,* 10-11, first term.

Professor Gray.

PHYSICS XI.

Required of students in fourth year of Course H.

ELECTRICITY. The lectures in this course are on advanced Electrodynamics.

Lectures—Monday, Wednesday, and Friday, 11-12, second term.

Professor Flammer.

PHYSICS XII.

Required of students in fourth year of Course H.

PHYSICAL OPTICS. The lectures in this course are on the theory and phenomena of Physical Optics, including a discussion of Wave Motion, Diffraction, Interference Spectroscopes, Polarization, and Double Refraction.

Lectures—Tuesday and Thursday, 11-12, second term.

Professor Robertson.

PHYSICS XIII.

Required of fourth year students in Course H.

An advanced laboratory course of experiments in Optics, Electricity and Magnetism and Heat.

Thursday and Friday, 1.30-4.30.

Professor Robertson, Professor Gray and Professor Hughes.

PHYSICAL LABORATORIES.

The Physics Department is located in Ontario Hall, and contains two large lecture rooms, with seating capacities of 125, and 90 respectively, a small lecture room with seating capacity of 60, two small class rooms, three large rooms equipped as general elementary laboratories, several other rooms equipped for advanced work, offices for the staff, research rooms, a large, well-lighted library and reading room, smaller rooms for special purposes, apparatus and store rooms. The equipment for lecture table and laboratory is steadily growing and comprises most of the more important pieces of apparatus for these purposes.

Research in Physics is being carried on by members of the staff and by senior students. It is desired to extend this activity as far as possible. A limited number of workers who desire to use the facilities of the laboratory may be admitted and assisted. Particulars may be obtained from the Professor of Physics.

LIBRARY

The Departmental library contains text-books, works of reference, and journals devoted to Physics and related subjects. These may be freely consulted by the student in the reading room between the hours of 8 a.m. and 5 p.m. Books may in general be taken from the building overnight upon reporting to a member of the office staff and signing the library card. Books may be kept longer than one night at a time only by special permission.

CHEMISTRY.

PROFESSOR—J. A. McRae, M.A., Ph.D., F.R.I.C., F.R.S.C.

PROFESSOR—Grenville B. Frost, B.A., Ph.D.

PROFESSOR—L. A. Munro, M.A., Ph.D., F.R.S.C.

ASSOCIATE PROFESSOR—J. F. Logan, M.A., Ph.D.

ASSOCIATE PROFESSOR—Roy L. Dorrance, M.A., F.C.I.C.

ASSISTANT PROFESSOR—W. M. Smith, B.Sc., Ph.D.

ASSISTANT PROFESSOR—A. F. McKay, B.S., M.Sc., Ph.D.

INSTRUCTOR—W. H. Stevens, M.Sc.

C.I.L. FELLOW—F. W. Southam, B.Sc.

MILTON HERSEY FELLOW—C. H. Amberg, B.A.

WILLIAM NEISH FELLOW—S. K. Haig, B.A.

DEMONSTATORS—V. Harrison, B.Sc., J. C. MacTavish, B.A., Mrs. A. G. W. Lamont, B.A.Sc., W. L. Ott, W. K. Buchanan, B.A., J. W. Earley, B.A., A. G. W. Lamont, B.A.Sc., R. J. Merrill, B.Sc.

	First Courses.	Second or Advanced Courses.	Research Training Courses.
General Chemistry	I	II, III	IV
Qualitative Analysis	I	———	—
Organic Chemistry	I, V	II	IV
Quantitative Analysis	I, II	———	IV
Physical Chemistry	I	II, III	IV
Industrial Chemistry	I, II	IIIa	IV
Colloid Chemistry	Ia	II	IV

GENERAL CHEMISTRY I.

For all first year students in Science.

The history, methods of preparation, properties and industrial applications of the more important non-metallic elements and their compounds are discussed in the lectures and the fundamental theories, laws and principles of chemistry emphasized. The first part of the laboratory work consists of a number of experiments illustrating gravimetric and volumetric procedures, in the second part the qualitative reactions of the acid radicals are studied. A set of problems is assigned each week.

Text books—Sherwood Taylor, *Inorganic and Theoretical Chemistry,* (Heineman); Dorrance, *Experiments and Problems in General Chemistry.*

Lectures—Sections 1-2, *Monday, Wednesday* and *Friday,* 9-10; *Sections* 3-4, *Monday, Wednesday* and *Friday,* 2.30-3.30; Sections 5-6, *Thursday,* 9-10, *Tuesday,* 2.30-3.30, and *Saturday,* 8-9; Sections 7-8, *Monday,* 11-12, *Wednesday,* 8-9, and *Saturday,* 9-10.

Laboratory—Sections 1-2, *Wednesday,* 1.30-4.30; Sections 3-4, *Wednesday,* 9-12; Sections 5-6, *Friday,* 9-12; Sections 7-8, *Tuesday,* 1.30-4.30.

Professor Dorrance and Mr. Stevens.

General Chemistry II.

For students in Courses EFG Second Year.

This lecture course is designed to supplement Chemistry I, including such chemical principles, facts and theories as find application in Civil, Mechanical and Electrical Engineering. Some of the topics dealt with are the chemistry of the metals, the laws of solution, pH and its measurement, electrochemistry, the colloidal state and simple organic types as applied to corrosion, water conditioning, fuels, plastics and rubbers, paints and enamels, insulators, etc. These topics are illustrated by lecture experiments and problems.

Reference texts—Gyngell, *Applied Chemistry for Engineers;* Sherwood Taylor, *Inorganic and Theoretical Chemistry* (Heinemann); White, *Chemistry of Engineering Materials* (McGraw Hill); Chapin, *Second Year College Chemistry* (Wiley).

Lectures—Sections 1-4, *Thursday,* 3.30-4.30 and *Saturday,* 11-12; Sections 5-8, *Wednesday* and *Friday,* 9-10.

Professor Munro.

General Chemistry III.

Advanced Inorganic Chemistry.

For students in Course B, third year.

A study of inorganic chemistry based on the modern form of the periodic system and the electronic theory of valency.

Lectures—Monday and *Wednesday* at 9.

Professor Frost.

General and Inorganic Chemistry IV.

Research Training

For students in Course B, fourth year, electing thesis option in General and Inorganic Chemistry.

Professors Frost, Munro, and Smith.

Qualitative Analysis I.

For students in Courses A, B, C, D, M, second year.

The lectures deal with the theory of analytical chemistry. The modern concept of the structure of matter is related to analytical behaviour. The development and application of the laws of equilibrium and solutions are emphasized.

The laboratory work consists of the systematic analysis of basic and acid ions leading to the analysis of alloys, salt mixtures, minerals and various commercial products.

Texts—Curtman, *Semi-Micro Qualitative Chemical Analysis* (Macmillan); Munro, *Laboratory Chart.*

Reference Texts—Sherwood Taylor, *Inorganic and Theoretical Chemistry* (Heinemann); Treadwell Hall, *Qualitative Analysis* (Wiley).

Lectures—Tuesday and *Thursday,* 11-12, Gordon Hall.

Laboratory—Section 1, *Monday.* 1.30-4.30 (a), 2.30-5.30 (b), *Saturday,* 9-12; Section 2, *Thursday* and *Friday,* 1.30-4.30.

Professor Munro.

Organic Chemistry I.

For students in Courses B and D, third year.

An introductory course on the chemistry of the compounds of carbon. The principal classes of aliphatic and aromatic compounds are studied to illustrate both their theoretical and practical importance. In the laboratory a number of aliphatic and aromatic compounds is prepared to illustrate typical operations employed in organic chemistry.

Texts—Richter, *Text-book of Organic Chemistry* (Wiley); Adams and Johnson, *Laboratory Experiments in Organic Chemistry* (Macmillan).

Lectures—Wednesday and Friday, at 11 in room 310 Gordon Hall (Wednesdays) and in Nicol Hall (Fridays).

Laboratory—B Students, *Monday,* 1.30-4.30 in rooms 213 and 201, Gordon Hall. D students, *Tuesday,* 1.30-4.30.

Professor McRae.

Organic Chemistry V.

For students in Course M, third year.

An introductory course in Organic Chemistry for students in Metallurgy.

Text-book—Garard, *Introduction to Organic Chemistry* (Wiley).

Lecture—Friday, 11-12.

Professor McKay.

Organic Chemistry II.

For students in Course B, fourth year.

The principal reactions used in synthetic organic chemistry with practical illustrations in the laboratory. The more detailed chemistry of the aliphatic and aromatic series and of the simpler types of heterocylic compounds. Laboratory practice in qualitative and quantitative organic chemistry.

Texts—Fieser and Fieser, *Organic Chemistry* (Heath), or Richter, *Textbook of Organic Chemistry* (John Wiley); Adams and Johnson, *Laboratory Experiments in Organic Chemistry* (MacMillan).

Books of Reference—Karrer, *Organic Chemistry* (Elsevier Co.); Whitmore, *Organic Chemistry* (Van Nostrand); Kipping and Kipping, *Perkin and Kipping's Organic Chemistry,* Part III; Gatterman-Wieland, *Laboratory Methods of Organic Chemistry* (Macmillan).

Lectures—Tuesday and Thursday, at 11, in room 105, Gordon Hall.

Laboratory—Friday, 1.30-4.30; *Saturday,* 9-12, in room 213, Gordon Hall.

Professor McRae.

Organic Chemistry IV.

Research Training.

For students in Course B, fourth year, electing thesis option in Organic Chemistry.

Professors McRae and McKay.

Quantitative Analysis I.

For students in Courses A, C, D and M, third year.

This is an elementary course designed to illustrate the fundamental procedures of Quantitative Analysis.

Text—Hamilton and Simpson, *Elementary Quantitative Analysis* (Van Nostrand), *Talbot's Quantitative Chemical Analysis* (Macmillan).

Lectures—A, *Thursday,* 1.30-2.30; D, M and C, *Wednesday,* 10-11, in room 400, Gordon Hall.

Laboratory—Thursday, 1.30-4.30 for D, *Friday* 1.30-4.30 for C and M, *Tuesday,* 1.30-4.30, Section 1 of A; *Saturday,* 8-11, Section 2 of A.

Professor Dorrance

Quantitative Analysis II.

For students in Course B, third year.

The theory and technique of gravimetric and volumetric analysis.

Texts—Hamilton and Simpson, *Talbot's Quantitative Chemical Analysis* (Macmillan); *Elementary Quantitative Analysis* (Van Nostrand), Vogel, *A Text Book of Quantitative Inorganic Analysis* (Longmans).

Lectures—Tuesday and *Thursday* at 8, in room 400, Gordon Hall.

Laboratory—Wednesday, 1.30-4.30, and *Thursday,* 1.30-4.30; *Saturday,* 8-12, second term, in 207, 210 Gordon Hall.

Professor Dorrance.

Quantitative Analysis IV.

Research Training.

For students in Course B, fourth year, electing thesis option in Quantitative Analysis. Professor Dorrance.

Physical Chemistry I.

For students in Courses B, C, D, M, third year.

The pressure-volume relations of gases; the nature of the liquid and solid states; solutions; chemical and phase equilibria; thermochemistry; chemical kinetics, and other related topics.

Text—Millard, *Physical Chemistry for Colleges* (McGraw-Hill).

Lectures—Tuesday and Thursday, at 9, in room 105, Gordon Hall.

Laboratory—Friday, 1.30-4.30 for B, *Tuesday,* 1.30-4.30 for C, *Wednesday* 1.30-4.30 (a) and *Saturday* 9-12 (b) for M, in 115, 116 Gordon Hall.

Students in course D will take physical chemical laboratory in the Chemical Engineering Department.

Wednesday, 1.30-4.30 (a), *Saturday,* 9-12 (b). Professor Frost.

Physical Chemistry II.

Electrochemistry.

For students in Courses B, D, M, fourth year.

A discussion of the electrochemistry of aqueous solutions; applications to chemical analysis and to industrial processes, including fused systems.

The laboratory work includes electrolytic preparations, electrical measurements of the properties of solutions and electrometric titrations.

Texts—Thompson, *Theoretical and Applied Electrochemistry* (MacMillan); Glasstone, *An Introduction to Electrochemistry* (Van Nostrand); Kolthoff and Laitenen, *pH and Electrotitrations* (McGraw-Hill), Creighton, *Electrochemistry.*

Lectures—Monday at 10; *Tuesday* at 8 (a), *Thursday* at 8 (b).

Laboratory—B and M, *Wednesday* 1.30-4.30; D, *Thursday* 1.30-4.30.

Professor Smith.

Physical Chemistry III.

Advanced Physical Chemistry.

For students in Course B, fourth year.

The principles of chemical thermodynamics and their application to chemical problems.

Text—Lewis and Randall, *Thermodynamics and the Free Energy of Chemical Substances* (McGraw-Hill).

Lectures—Tuesday and Thursday, **at 10, in 105 Gordon Hall.**

Laboratory—Thursday, 1.30-4.30, in 116 Gordon Hall.

Professor Frost.

Physical Chemistry IV.

Research Training.

For students in Course B, fourth year, electing thesis option in Physical Chemistry.

Professors Frost, Dorrance, Munro, and Smith.

Industrial Chemistry II.

For students in courses B and D, third year.

D students, third year, see under Department of Chemical Engineering.

The lectures deal with the following topics: wood, coal and other fuels: for steam raising and drinking purposes; the petroleum industry; industrial gases, gas producers, by-product coke and illuminating gas; sulphuric acid, alkali and ammonia; hydrochloric, nitric and acetic acids, acetone; electric furnace products, fertilizers, explosives and artificial silk, manufacture of wood pulp.

In the laboratory typical processes, such as dissolution, crystallization, water and gas analysis, ordinary and fractional distillation, preparations involving incomplete chemical reaction, are studied, emphasis being laid on systematic records and interpretation of results.

Text—E. R. Riegel, *Industrial Chemistry.*

Handbooks—Hodgman-Lange, *Handbook of Chemistry and Physics* (Chemical Rubber Co.), or Lange's *Handbook of Chemistry* (Handbook Publishing Co.).

Lectures—Tuesday and Thursday at 10-11, Ontario Hall.

Laboratory—B, *Tuesday,* 1.30-4.30, in Ontario Hall.

D students see under Dept. of Chemical Engineering.

Professor Plewes.

Industrial Chemistry IIIa.

For students in Course B, fourth year—first term.

For outline of topics see under Department of Chemical Engineering.

Texts—E. R. Riegel, *Industrial Chemistry;* Badger and Baker, *Inorganic Chemical Technology.*

Lectures—Wednesday and *Friday,* at 11, first term, in Ontario Hall.

Laboratory—Monday, 1.30-4.30, first term, in Ontario Hall.

Professor Plewes.

Industrial Chemistry IV.

Research Training.

For students in Course B, fourth year, electing thesis option in Industrial Chemistry.

Professor Plewes.

Colloid Chemistry Ia

For students in Course D, fourth year, first term. A short introductory course in Colloid Chemistry. The lectures deal with the general properties of the colloidal state, particle size and sedimentation analysis, dialysis, ultrafiltration, electrokinetic phenomena, Donnan equilibrium, and emulsions.

The laboratory work illustrates and supplements the material dealt with in lectures.

Text-book—Hedges, *Colloids* (Arnold), or Hartman, *Colloid Chemistry* (Houghton-Mifflin Co.).

Reference Text—Lewis, Squires & Broughton, *Colloidal and Amorphous Materials* (Macmillan).

Lectures—Wednesday and *Friday* at 10, first term.

Laboratory—Saturday, 9-11, first term, or *Thursday,* 1.30-3.30, first term.

Professor Munro

Colloid Chemistry II

For students in Course B, fourth year.

A course in Surface Chemistry treating the general properties of the colloidal state and heterogeneous catalysis. The first half of the course deals with: the colloidal state, particle size and sedimentation, dialysis, Donnan equilibrium, ultrafiltration, electrokinetic phenomena, surface energy, interfacial tensions, heterogeneous flocculation and protective action, emulsions and foams. The second part of the course is devoted to the study of gels, thermoplastic and thermosetting resins, natural and synthetic rubber, sorption, catalysts, activation, promotors, carriers, retarders, and chain reactions.

The laboratory work illustrates the topics dealt with in lectures.

Texts—Hartman, *Colloid Chemistry* (Houghton Mifflin Co.); Griffith, *The Mechanism of Contact Catalysis* (Oxford University Press); Powers, *Synthetic Resins and Rubbers* (Wiley).

Reference Texts—Weiser, *Inorganic Colloid Chemistry,* I-III (Wiley); Squires et al, *Colloidal and Amorphous Materials* (Macmillan); McBain, *The Sorption of Gases by Solids* (Routledge); Maxted, *Catalysis and its Industrial Applications* (Churchill); Berkman, Morell and Egloff, *Catalysis* (Reinhold Corp.); Ellis, *The Chemistry of Synthetic Resins* (Reinhold); Mantell, *Adsorption* (McGraw-Hill).

Lectures—First term, *Wednesday* and *Friday* at 10 a.m.
Second term, *Monday, Wednesday* and *Friday* at 11 a.m.

Laboratory—Tuesday, 1.30-3.30, first term only.

Professor Munro.

GEOLOGY

Emeritus Professor and Curator of the Museum—M. B. Baker, B.A., B.Sc., F.G.S.A., F.R.S.C.

Miller Memorial Research Professor—
E. L. Bruce, B.Sc., M.A., Ph.D., F.R.S.C., F.G.S.A.

Professor—B. Rose, B.Sc., Ph.D., F.G.S.A., F.R.S.C.

Special Lecturer—J. Willis Ambrose, B.A., Ph.D., F.R.S.C., F.G.S.A.

Assistant Professor—M. L. Keith, B.Sc., M.Sc., Ph.D., F.G.S.A.

Tutor—J. Hill, M.A., B.Sc.

Assistants—D. F. Aitkens, B.Sc., D. C. Bulmer, B.Sc., M. E. Hriskevich, B.Sc.

Research Assistance—F. G. Matthews, B.Sc.

The Geological and Mineralogical Museum situated on the ground floor of Miller Hall, is equipped with splendid collections of minerals, ores, rocks and fossils, classified and systematically arranged to illustrate most of the subjects treated in lectures. This is a section of the work in which the co-operation of the mining public is invited, and all donations to this museum will be kept and credited to the donor.

The various courses in Geology, described in some detail below, are intended for the professional geologist, the mining engineer, the civil engineer requiring a knowledge of the relative merits of natural constructive material.

GEOLOGY I.

For second year students in courses A, B, C, D, M.

ELEMENTARY GEOLOGY. Students taking this class must have passed in Chemistry I.

An introductory course in general Geology for those students who intend to proceed to a more advanced course in Geology or Mining, and at the same time a more or less complete, though elementary course for those who do not pursue the subject.

During the month of October excursions will be conducted to places of geological interest in the vicinity of Kingston. Students in Geology and Mineralogy are required to take part in these excursions.

Text-book: Longwell, Knopf, Flint, Schuchert and Dunbar, *Outlines of Geology* (Wiley).

Lectures—Tuesday and Thursday, 9-10. Dr. Ambrose.

GEOLOGY II.

For third year students in Course C and fourth year students in Course A (geology option).

STRUCTURAL GEOLOGY AND GEOMORPHOLOGY.

Inherent and imposed structures in sedimentary, igneous and metamorphic rocks, with particular attention to sedimentation, faulting, folding, and shearing. Topography, using structure as a basis of interpretation. Physiographic cycles under normal, arid, glacial, karst, and marine conditions. The interpretation of topographic and geologic maps. Where possible, illustrations from Canadian occurrences are used.

Text-books—Nevin, *Structural Geology*; Platt, *Geological Map Exercises.*

Lectures—Monday and *Wednesday,* 9-10.

Laboratory—Friday, 8-10 for C students, 9-10 for A (geology option).

Professor Rose.

GEOLOGY III. (b)

For students in Courses A and C, third year.

PETROGRAPHY. Students must have passed in Geology I.

This course is essentially on igneous geology and petrography, and on the determination of some of the more common rocks and rock minerals by both field and microscopic tests. Some attention will be paid to the sedimentary and metamorphic rocks. The lectures will be supplemented by laboratory work on hand specimens and rock slices.

Text-book—Pirsson and Knopf, *Rocks and Rock Minerals.*

Lectures—Tuesday and Thursday, 10-11, second term.

Laboratory—Tuesday, 1.30-3.30 and 3.30-5.30, second term.

Professor Keith.

GEOLOGY IV.

For third year students in Course A.

STRUCTURAL GEOLOGY—Students must have passed in Geology I.

Imposed structures in sedimentary, igneous, and metamorphic rocks, with particular attention to faulting, folding, and shearing. Illustrated mainly from Canadian occurrences where possible.

Text-book—Nevin, *Structural Geology.*

Lecture—Tuesday and *Friday,* 11-12 (a). Professor Rose.

GEOLOGY V.

For fourth year students in Courses A and C.

GEOLOGY OF CANADA. The physiographic provinces, the rock formations, their character, structure, age and distribution,—topography and general geological history with special attention to Pleistocene glaciation and of non-metallic deposits stressed. Details of the geology of the Canadian Shield and of the metallic deposits are referred to the course in Economic Geology.

Lecture—Wednesday, 8-9.

Professor Keith.

GEOLOGY VI.

For fourth year students in Course C.

HISTORICAL GEOLOGY. After a brief study of the various types of sedimentary formations and the principles of paleogeography, the history of the North American continent is taken up with supplementary references to the other continents when desirable. Emphasis is laid on Canadian occurrences. A number of the more important fossils of each period are studied, and their recognition on sight required. Brief consideration is also given to the history of the Science of Geology.

Text-book—Schubert and Dunbar, *Text-book of Geology, Part II,—Historical* (John Wiley and Sons).

Lectures—Tuesday and Thursday, 9-10. Professor Rose.

Laboratory—Monday, 2.30-4.30.

GEOLOGY VII.

For third year students in Course C and fourth year students in Course A (geology option).

MICROSCOPICAL PETROGRAPHY. A laboratory class on the identification rocks and rock minerals under the microscope.

Laboratory—Thursday, 1.30-3.30, section 1; 3.30-5.30, section 2, second term. Professor Keith.

GEOLOGY VIII.

For fourth year students in Courses A and C.

ECONOMIC GEOLOGY. This class treats of the principles of ore deposition. The basis of classification and the fundamental principles underlying the formation of economic deposits.

Text-book—Tarr, *Introductory Economic Geology* (McGraw-Hill).

Lectures—Monday and *Tuesday,* 11-12.

Professor Bruce.

GEOLOGY IX.

For third year students in Course E.

ENGINEERING GEOLOGY. This course is intended for students in Civil Engineering. After a brief introduction to geology it will treat of the occurrence, composition, texture, structure and alterations of rocks, with special reference to their effects on the workability or removal of the rocks in excavation, and in the selection of raw material in construction work. There will also be lectures on clay-products and the selection of building materials, and an outline of the manufacture of bricks, fire-proof blocks, terra-cotta, roofing-tile, sewer-pipe, and drainage-tile, will be given. Physiography and drainage will also be studied, and a brief discussion of the principles of economic geology.

Text-book—Ries and Watson, *Elements of Engineering Geology.*

Lectures—Wednesday and Thursday, 11-12. Dr. Ambrose.

GEOLOGY X

For third year students in Course C and fourth year students in Course A (Geology Option).

FIELD GEOLOGY. Field work consists of a systematic geological survey of a selected area in southeastern Ontario. Unless otherwise announced headquarters for the survey camp will be Queen's Biological Station on Lake Opinicon. Students live at the camp and complete their field work during the weeks preceding fall registration (dates to be announced). It is necessary that students register for Geology X in the spring and arrange to return one week early.

Each student plots the survey data and prepares a contoured geological map to scale, together with a geological report on the area studied.

Reference Book—Lahee, *Field Geology.*

Lectures and *Laboratory—Monday,* 1.30-5.30, first term.

Professor Keith.

GEOLOGY XI

For third year students in Course C and fourth year students in Course A (Geology Option).

Geophysical Prospecting. A course of lectures is given on methods of geophysical prospecting, including magnetic, electrical, seismic, and gravimetric methods, and methods dependent upon radioactivity of rocks and minerals. Emphasis is placed on applications to particular problems in geology, and on interpretation of results by the geologist.

Students are given the opportunity of using the instruments in the laboratory and of making test geophysical surveys.

Reference Books—Eve and Keyes, *Applied Geophysics in the search for Minerals;* Heiland, *Geophysical Exploration.*

Lectures and *Laboratory—Monday,* 1.30-5.30, second term.

Professor Keith.

GEOLOGY XII.

For fourth year students in course C.

Petrology.

A course of lectures will be given on petrographic methods and on igneous, sedimentary and metamorphic petrology. Considerable attention will be given to the genesis of rock types and to the physico-chemical conditions effective in the generation and the differentiation of magmas.

Text-book—Grout, *Petrography and Petrology.* (McGraw-Hill).

Lectures—Tuesday and *Thursday,* 10-11, first term.

Laboratory—Wednesday, Section 1, 1.30-3.30; Section 2, 3.30-5.30, first term.

Professor Keith.

Reports

For fourth year students in Course C.

Weekly reports or essays based on field trips, summer work, or on topics of a mineralogical or geological nature as prescribed by the departments of Geology and Mineralogy will be required. These are intended to test the students' ability to read up a subject, and then to summarize it in presentable form for publication. The class will be conducted by the department of Geology for the first term, and by the department of Mineralogy for the second term.

Mr. Hill.

Research and Thesis

Each student in Course C is required to undertake a piece of research and submit a satisfactory thesis on or before April 1st of his fourth year. Problems of a field or laboratory character may be studied, and students should consult with instructors in the Departments of Mineralogy and Geology at the end of their third year and not later than the beginning of the fourth with regard to subjects.

Hours—3a, 6b.

GRADUATE COURSES

For graduates in Courses A (Geology option) and C.

GEOLOGY XIII.

PRINCIPLES OF PRE-CAMBRIAN GEOLOGY. The origin, history and distribution of the rocks older than the Cambrian. Special attention will be given to Canadian Pre-Cambrian areas. It will be offered in 1947-48.

Lectures—Monday and Wednesday at 11.

Laboratory—Friday, 1.30-4.30.

Professor Bruce.

GEOLOGY XIV.

METAMORPHIC AND STRUCTURAL GEOLOGY. The processes of rock weathering, consolidation of sediments, formation of gneisses, and the wall rock alterations produced by veins are studied in detail. The principles of rock deformation are discussed. The course will be offered in alternate years. It will be offered in 1947-48.

Lectures—Tuesday and Friday at 11.

Laboratory—Friday, 1.30-4.30 or *Saturday* 9-12.

Dr. Ambrose.

GEOLOGY XV.

PRE-CAMBRIAN ORE DEPOSIT. Discussion of ore deposits in Pre-Cambrian rocks with especial reference to those in Canada. The genesis and character of the deposits will be studied in detail. It will not be offered in 1947-48.

Text Book: Bruce, *Mineral Deposits of the Canadian Shield,* (Macmillan).

Lectures—Monday and Tuesday at 11.

Laboratory—Tuesday, 1.30-4.30 or *Wednesday,* 1.30-4.30.

Professor Bruce.

Excursions to accessible localities are required.

GEOLOGY XVI(a)

CHEMICAL PETROLOGY. This course comprises a critical review of petrological processes. It is planned as a directed discussion based upon selected references pertaining to both laboratory and field investigations of the genesis of rocks. Offered in 1947-48.

Lectures—Periods to be arranged.

Professor Keith.

GEOLOGY XVII(b)

METAMORPHIC GEOLOGY. A study of rock alteration and the character and origin of gneisses and schists.

Dr. Ambrose.

GEOLOGY XIX.

REGIONAL GEOLOGY. A study of the general geology of selected regions to illustrate geological processes and to correlate the stratigraphic and diastropic history of the world.

Periods to be arranged. Professor Rose.

SEMINAR

A Seminar for students in graduate courses meets two evenings each month. It is voluntary and no registration is required.

MINERALOGY

PROFESSOR—J. E. Hawley, M.A., Ph.D., F.G.S.A., F.R.S.C.

ASSISTANT PROFESSOR—L. G Berry, M.A., Ph.D., F.G.S.A., F.M.S.A.

ASSISTANTS—R. A. Hughes, B.Sc., A. R. Graham, B.A., B.Sc., J. Earley, B.Sc.

TUTOR—J. Hill, M.A., B.Sc.

The work in this department is intended for students taking the courses in (1) Mining Engineering, (2) Chemistry, (3) Mineralogy and Geology, (4) Chemical Engineering, and (5) Metallurgical Engineering.

MINERALOGY I.

For Second year students in Courses A, B, C, D, M.

ELEMENTARY MINERALOGY—Lectures cover (1) the physical properties and identification of the common rock and ore forming minerals, (2) The relation between Mineralogy and Geology, (3) The chemistry of minerals, (4) Crystallography, (5) World distribution of minerals which are of economic importance, (6) the detailed properties, occurrence and uses of about one hundred important minerals. In the laboratory practical work is given in crystallography and in the identification of minerals by physical tests and blowpipe methods.

Field trips during October and November are held in conjunction with the Department of Geology.

Each student is supplied for the session with a locked cabinet containing a collection of minerals for which he is held responsible. *A practical examination requiring the identification of minerals in hand specimens must be passed by each student before credit in this course will be given.* Students are urged to make use of the museum, and of the study room provided for them in the Mineralogy department.

Text-books—For Courses A and C, Ford, *Dana's Text-book of Mineralogy,* (Wiley, 1932), 4th edition. For Courses B and D, choice of Hurlbut, *Dana's Manual of Mineralogy,* 15th edition, 1941; or Kraus, Hunt, and Ramsdell, *Mineralogy* (McGraw-Hill, 1936).

Books of reference—Kraus and Hunt, *Mineralogy,* 3rd edition (McGraw-Hill, 1936); Rogers, *Study of Minerals,* 3rd edition (McGraw-Hill, 1937); Brush and Penfield, *Manual of Determinative Mineralogy and Blowpipe Analysis,* 17th edition, 1912 (Wiley).

Saturday Excursions.

Lectures—Wednesday, 10-11, first term; *Wednesday* and *Friday,* 8-9, second term.

Professor Hawley, Dr. Berry and Assistants.

Laboratory—Section 1, *Friday,* 1.30-3.30; Section 2, *Monday,* 1.30-3.30, first term, 3.30-5.30, second term.

MINERALOGY II.

PHYSICAL MINERALOGY. For students in Course C, Third year, and Course A, Fourth year, Geology option.

The work consists of a course of lectures, dealing with crystallography, crystal measurements and drawing, and a more advanced study of the physical properties of minerals.

Text-books—Dana, *Text-book of Mineralogy,* 1932. (Wiley & Sons).
James, *X-Ray Crystallography* (Methuen), 1930.

Books of Reference—Bragg, *Atomic Structure of Minerals* (Cornell Univ. Press), 1937; Wyckoff, *The Structure of Crystals,* (1931); Bragg, *X-Ray and Crystal Structure,* 4th Edition; Evans, *Crystal Chemistry,* (Cambridge Univ. Press, 1939.)

Lectures—Monday at 8 and *Friday* at 11, second term.

Laboratory—Saturday, 10-12, second term. Dr. Berry.

MINERALOGY III.

For students in Courses B, and C, third year.

OPTICAL MINERALOGY—The work of this class deals with the optical properties of nonopaque chemical substances and natural minerals. For chemistry students it serves as an accurate method of identifying both organic and inorganic solid chemical substances by their indices of refraction and other optical properties, provided these are known, as a method of proving homogeneity of fine chemical compounds, and as an introduction to microchemical methods of testing for minor constituents in inorganic compounds. For geology and mineralogy students it is preparatory to the classes of petrography and determinative mineralogy and deals with the optical properties of the common rock forming minerals.

Text-book—Dana, *Text-book of Mineralogy,* 4th ed., 1932 (Wiley), or Winchell, *Elements of Optical Mineralogy* (Part I), 5th ed., (Wiley), 1937, or Rogers and Kerr, *Optical Mineralogy* (McGraw-Hill), 1942, or Hartshorne and Stuart, *Crystals and the Polarising Microscope* (Arnold), 1934 (recommended for Course B students), or Wahlstrom, *Optical Crystallography,* 1943, (Wiley).

Lectures—Monday, at 8, and *Friday,* at 10, first term.

Laboratory—B—*Saturday,* 10-12; C—*Wednesday,* 10-12 or 3.30-5.30 (2 sections).

Dr. Berry.

MINERALOGY IV.

For students in Courses A and C, Third year.

DESCRIPTIVE AND DETERMINATIVE MINERALOGY—ORE MINERALS. A course dealing with minerals which are important as ores of iron, manganese, chromium, tungsten, vanadium, tin, nickel, cobalt, gold, silver, copper, lead, zinc and aluminum. In the laboratory suites of ore minerals from various mining camps are examined by blowpipe methods and microscopically by polished sections. A brief survey is made of some important non-metallic minerals. Cabinets furnished with specimens of minerals from various parts of the world are supplied for students' use. Examination of a variety of mineral deposits in the vicinity of Kingston is made in October and November. Reports on these are required.

Text-books—Dana, *Text-book of Mineralogy,* 4th ed. 1932 (Wiley); choice of Tarr, *Introductory Economic Geology* (McGraw-Hill 1938), or Lindgren, *Mineral Deposits* (McGraw-Hill 1933). Reports on various deposits will be available in reading room.

Lectures—Tuesday and *Thursday,* 8-9 (a); *Tuesday* at 8 and *Friday,* at 10 (b).

Laboratory—Wednesday, 1.30-3.30, or 3.30-5.30.

Professor Hawley.

MINERALOGY V.

For students in Course C, Fourth year.

ADVANCED DESCRIPTIVE AND DETERMINATIVE MINERALOGY—NON-METALLIC MINERALS. A course dealing (1) with the identification of rock forming minerals by physical and optical properties; (2) the occurrence and utilization of non-metallic minerals used for Abrasives, Refractories, Ceramic Ware, Lime, Cements, Plaster, Fertilizers, Pigments, Insulators, Building Stone Gems, etc.

Text-book—*Elements of Optical Mineralogy*—Part II, (Description of Minerals), A. N. Winchell, (Wiley and Sons).

Reference Books—*Publications of Geological Survey of Canada; Publications of Mines Branch, Dept. of Mines, Canada; Publications of U.S. Geol. Survey; Non-Metallic Minerals*—Ladoo (McGraw-Hill, 1925).

Lectures—Wednesday and *Friday* at 11 (a), *Tuesday* at 10, *Wednesday* at 11 (b).

Laboratory—Tuesday, 1.30-3.30.

Professor Hawley and Dr. Berry.

MINERALOGY VI.

For fourth year students in Courses C, A (Geology Option), and M (optional).

MINERALOGRAPHY—An advanced laboratory course in the study of metallic minerals in polished sections.

Text—Microscopic Determination of the Ore Minerals, U.S.G.S. Bull. 914, 1940. M. N. Short.

Lecture and Discussion—Thursday, 1.30-2.30, first term only.

Laboratory—First term, *Thursday,* 2.30-4.30.

Professor Hawley.

MINERALOGY VIIa

For third year students in Course M.

ORE MINERALS—Their properties, chemistry and association. A course of lectures for third year Metallurgy students consisting of the first term lectures of Mineralogy IV.

Lectures—Tuesday and *Thursday* at 8, first term.

REPORTS

Biweekly reports and essays on mineralogical topics to be assigned.

Tuesday, 3.30-4.30, Discussion Hour — *second term.* Total hours per week—4.

Mr. Hill.

RESEARCH AND THESIS

Each student in Course C is required to undertake a piece of research and submit a satisfactory thesis on or before April 1st of his fourth year. Problems of a field or laboratory character may be studied, and students should consult with instructors in the Departments of Mineralogy and Geology at the end of their third year and not later than the beginning of the fourth with regard to subjects.

Hours—3a, 6b.

GRADUATE COURSES

For graduates in Courses A and C.

MINERALOGY XV.

ADVANCED OPTICAL MINERALOGY—A course designed to give students further training in the determination of optical properties of minerals. Special study will be made of igneous and metamorphic minerals, and of the heavy residuals of sedimentary rocks. Offered during session 1947-48.

Lectures and Laboratory—5 hours a week, to be arranged.

Professor Hawley.

MINERALOGY XVI.

(a) ADVANCED STUDY OF ORE MINERALS AND MINERALOGRAPHY:

Texts—Lindgren's *Mineral Deposits* (McGraw-Hill 1933).

Determination of the Ore Minerals, U.S.G.S. Bull. 914, 1940. N. M. Short.

This course alternates with Mineralogy XV. Not offered in session 1947-48.

Lectures and Laboratory—Five hours a week to be arranged.

Professor Hawley.

MINERALOGY XVII

STRUCTURAL CRYSTALLOGRAPHY—An introduction to our present knowledge of the structure of crystals, mainly by means of x-ray diffraction data, and the application of this knowledge to mineralogy. Laboratory work consists of familiarizing the student with x-ray equipment and the various types of diffraction cameras; practical work with mineral "fingerprinting," or comparisons, by means of powder diffraction patterns, interpretation of simple patterns obtained by powder, rotating crystal and Weissenberg methods; practical work with controlled temperature powder camera.

Text-book—R. W. James, *X-Ray Crystallography* (Methuen, 1930).

Reference books—W. H. Bragg and W. L. Bragg, *The Crystalline State* (Macmillan, 1934); R. C. Evans, *An Introduction to Crystal Chemistry* (University Press, 1939). Miscellaneous assigned readings.

Lectures and Laboratory—Five hours per week to be arranged.

Offered in session 1947-48.

Prerequisites—Mineralogy I, and Mineralogy II (10b), or the equivalent. Graduate students in Physics or Chemistry will be admitted to this course.

Dr. Berry.

MINING ENGINEERING.

PROFESSOR—S. N. Graham, B.Sc.

MINING I.

For students in Course A, third year.

The first part of this course includes a discussion of the shape and attitude of ore bodies and the description of the methods of surveying the underground openings required to work them. This is accompanied by drafting room work on mine mapping.

Lectures for the balance of the year include the following: prospecting, mining laws, exploration of prospects, diamond and churn drills, rock drills and steel, explosives, systematic methods of development and a brief description of common mining methods.

One hour a week in the second term is given to the reading and discussion of essays.

Text-books—Peele, *Mining Engineers Handbook;* Lewis, *Elements of Mining.*

Lecture and Laboratory—Tuesday and *Wednesday,* 9-11 (a); *Tuesday, Wednesday,* and *Thursday,* 9-10 (b).

Professor Graham.

MINING II.

For students in Course A, fourth year.

This course is a continuation of Mining I and includes the following subjects: rock pressure and methods of support; systematic study of underground metal mining methods; transportation, mucking, and tramming; drainage and pumping; mine atmospheres and mine ventilation; sampling and estimation of ore; mining costs, mine valuation and reports; a brief discussion of the principles of geophysical prospecting with special attention to magnetic methods.

Text-books—Peele, *Mining Engineers Handbook;* Lewis, *Elements of* Mining.

Lectures—Monday and *Tuesday,* 10-11; *Wednesday,* 1.30-2.30; *Tuesday,* 1.30-2.30 (a), and *Monday,* 1.30-2.30 (b).

Laboratory—Tuesday and *Wednesday,* 2.30-3.30.

Professor Graham.

Mining III.

For students in Course A, fourth year.

This is a drafting room class with problems in the design of mine buildings, wooden headframes and ore bins, arrangement of surface plant and underground workings, and transportation systems.

Text-book—Staley, *Mine Plant Design.*

Thursday, 1.30-4.30.

Professor Graham.

Mining IV.

For students in Courses C and M, fourth year.

This is a course of lectures briefly discussing the formation of ore-bodies, their development and exploitation, the machinery and equipment required, and the sampling and valuation of mining properties. It is intended to link up the work of the geologist and metallurgist with the mine.

Text-books—Lewis, *Elements of Mining;* Hoover, *Principles of Mining.*

Lectures—Monday, 1.30-2.30.

Professor Graham.

Summer Essay.

For students in Course A, fourth year.

In order to encourage close observation, and the faculty of expressing by text and illustration, the student during his summer vacations is expected to gather material for an essay of from two to three thousand words.

The essay must cover the result of personal observation and be on some subject relating to mining, milling, metallurgy or geology.

The subject title must be given before the end of October, and the essay handed in before the 15th of January. Essays requiring revision must be returned before the spring examinations begin.

All essays must be typewritten and suitably bound.

Ore Dressing.

For students in Courses A, C and M, third year.

These lectures follow the sequence of operations on an ore from the time it reaches the mill until it leaves as a concentrate or bullion. The principles and practice of rock crushing, ball milling, classification and concentration on jigs and tables are fully discussed. Particular attention is paid to the concentration of ores by flotation. Other accessory processes such as magnetic concentration are taken up and the flow sheets of different mills are studied.

Books of reference—Gaudin, *Principles of Mineral Dressing;* Rabone, *Flotation Plant Practice;* Taggart, *Handbook of Ore Dressing;* Richards and Locke, *Text Book of Ore Dressing.*

Lectures—Thursday, 10-12 (a), 11-12 (b). Professor Graham.

Milling.

For students in Courses A and M, fourth year.

Ores of the more common metals are investigated in the laboratories to determine suitable methods of concentration of or recovery of their metals by milling. Groups of two or three students are given an ore to investigate. Examination of the ore is first carried through by use of the microscope, by screen analyses, etc. Based on the information thus gained, a course of treatment on a sample of the ore is carried through. Each student takes part in the investigation and treatment of as many ores of the precious metals, and also of those of base metals and non-metallic minerals as time will permit.

Laboratory—Friday, 9-4.30, and *Saturday,* 9-12.

Professor Lord

Ore Dressing Laboratories

These are equipped for the testing of ores in small lots from various mining districts.

The equipment consists of a 7″ x 10″ Blake Crusher, gyratory, rolls and fine grinders for ore reduction. Equipment for complete investigation of ores and illustrating principles and process of treatment includes a 4′ x 18″ Dillon double deck vibrating screen; a Dorr 8″ hydraulic sizer; a Dorr 6′ duplex classifier in closed circuit with ball mill, thickness and agitators; small ball and pebble mills; various types of small screens and classifiers; Denver Jig; Wilfley tables, several types of small flotation machines and magnetic concentrators.

The *Fire-Assaying laboratory* contains seven gas muffle furnaces of different sizes and three oil muffle furnaces of 20 crucible capacity.

The Metallurgical Laboratories

The Metallurgical laboratories contain Victor X-Ray Diffraction Unit Type XRD2; X-Ray Radiograph unit; Eberbach Micro hardness tester; Universal Impact testing machine, 3 recording potentiometers, L & N Type K potentiometer, thermocouples, optical and radiation pyrometers, high frequency induction furnace and several small electric furnaces and ovens.

The Metallography laboratory is equipped with cutting and grinding equipment; specimen mount press and polishing equipment; microscopes; Leitz Metallograph and the necessary dark room and equipment.

Two well appointed chemical laboratories; a balance room and a room for electrolytic assaying complete the laboratory equipment of the Department.

METALLURGY.

PROFESSOR—T. V. Lord, B.Sc.

ASSISTANT PROFESSOR—O. A. Carson, B.Sc., A.M., Ph.D.

METALLURGY I.

For students in Courses E, F, G, third year.

A brief discussion of the physical properties and uses of the common metals. The more important industrial alloys, their composition, properties and uses. Refractory materials. The properties of iron and steel, the effects of impurities and of methods of manufacture and working, and the heat treatment of steel.

Reference Books—Bray, *Ferrous Production Metallurgy*; Rosenholtz and Oesterle, *Elements of Ferrous Metallurgy; Metals Handbook.*

Lecture—Tuesday, 10-11 (a), *Tuesday,* 8-9 (b). Professor Carson.

METALLURGY II.

For students in Courses A, B, M, third year.

Heat, calorimetry and pyrometry. Solid, liquid, and gaseous fuels and the special metallurgical uses of each kind. An introduction to general metallurgy—principles, operations and appliances. The metallurgy of iron and steel.

Reference Books—Bray, *Ferrous Production Metallurgy*; Rosenholtz and Oesterle, *Elements of Ferrous Metallurgy; Metals Handbook.*

Lectures—Monday, 11-12, *Wednesday,* 8-9 (a); *Monday,* 10-12 (b).

Professor Carson.

METALLURGY III.

For students in Course M, third year.

Metallurgy calculations based on the work covered in Metallurgy II.—heat, calorimetry, and pyrometry; heat balance, iron blast furnace charges, etc.

Lectures—Monday, 9-10; *Wednesday,* 9-10, first term; *Tuesday,* 10-11; *Wednesday,* 9-10, second term. Professor Carson.

METALLURGY IV.

For students in Courses A, M, fourth year.

The metallurgy of the more common non-ferrous metals—gold, silver, copper, lead, and zinc. The extraction of these metals from their ores, the refining of the metals, their uses, and the alloys into which they enter.

A consideration of the ordinary methods of recovering nickel, cobalt, tin, arsenic, antimony, etc., from the ores.

Text Books—Dorr, *Cyanidation and Concentration of Gold and Silver Ores;* Liddell, *Nonferrous Metallurgy.*

Lectures—Tuesday, 9-10; *Wednesday,* 11-12; *Thursday,* 11-12.

Professor Lord.

Metallurgy V.

For students in Course M, fourth year.

Metallurgical calculations related to the work covered in Metallurgy IV. Discussions of metallurgical subjects by the students and the reading and discussion of students' essays.

Lecture—Tuesday, 11-12, first term; *Thursday,* 9-10, second term.

Professor Lord.

Metallurgy VI.

For students in Courses M, G, fourth year.

Electro-metallurgy; introductory course in electro-chemistry followed by the consideration of the electrolytic refining of copper, gold and silver, the electrical smelting of aluminum, and electric furnaces.

Lecture—Tuesday, 11-12, second term. Professor Carson.

Metallurgy VII.

For students in Course M, fourth year.

Metallurgical plant design. The calculation of the capacities of units in a plant—agitators, sumps, pipes, launders, pumps, furnaces, converters, etc. Details of equipment. Flow sheets. General layout of plants. Bills of material. Power requirements.

The work will consist largely of individual problems for the library and drafting room.

Laboratory—Monday, 2.30-4.30. Professor Lord.

Metallurgy VIII.

For students in Course F, fourth year.

Laboratory course dealing with the heat treatment of steel.

Laboratory—Friday, 8-10, first term. Professor Carson.

Metallography.

Metallography I (*a*), Metallography II (*b*).

For students in Course M, fourth year.

Introductory course in metallography, including:

(*a*) Explanation and interpretation of equilibrium diagrams.

(*b*) Constitution and structure of some industrial alloys, with special reference to brasses, bronzes, bearing metals and different grades of steel.

Lecture and Laboratory work—Monday, 8-9; *Tuesday,* 1.30-4.30.

Professor Carson.

Students in Course M, fourth year, who are going into Chemical Metallurgy have the option of substituting Mineralogy VI for Metallography II.

Lecture and Laboratory—Mineralogy VIa, *Thursday,* 1.30-4.30 (a).

Professor Hawley.

Metallurgical Laboratory.

For students in Course M, fourth year.

Laboratory course dealing with a number of metallurgical operations. The following experiments are made by the students attending this course: Determination of calorific power and impurities in coals, standardization of pyrometers by various methods, determinations of cooling curves, decomposition of sulphates and reduction of oxides, heat treatment of steel.

Electroplating, operation of electric furnaces.

Laboratory—Thursday, 1.30-4.30, first term; *Thursday,* 2.30-5.30, second term.

Professor Carson

Summer Essay.

Required of students in Course M, fourth year.

In order to encourage close observation, and the faculty of expressing by text and illustration, the student during his summer vacations is expected to gather material for an essay of from two to three thousand words.

The subject title must be given in by October 15th of the final year, and the essay handed in before the end of the first term of the final year. Essays requiring revision must be returned before the spring examinations begin.

The material on which the essay is based must be information gained at first hand in metallurgical or chemical plants or laboratories or in mills during the equivalent of, at least, one complete summer vacation.

Fire Assaying.

For students in Courses A and M, third year.

The Laboratory course in fire assaying consists of:

(*a*) A number of experiments to test the action of the different reagents used and slags made in assaying.

(*b*) The determination of lead by fire assay methods.

(*c*) The determination of gold and silver in silicious, oxidized and sulphide ores and mattes.

Text-book—Bugbee, *Fire Assaying.*

Laboratory—First term. Course A, and M, Section 1, *Tuesday,* 1.30-5.30, Second term. Course M, Section 2, *Tuesday,* 1.30-5.30.

Professor Lord.

CHEMICAL ENGINEERING.

PROFESSOR—A. C. Plewes, Ph.D., M.Am.Inst.Chem.Eng., M.A.C.S.

ASSISTANT PROFESSOR—W. M. Campbell, B.A.Sc., M.S.

INDUSTRIAL CHEMISTRY II.

For students in Courses B and D, third year.

The lectures deal with the following topics: wood, coal and other fuels; water for steam raising and drinking purposes; the petroleum industry; industrial gases, gas producers, by-product coke and illuminating gas; sulphuric acid, alkali and ammonia; hydrochloric and nitric acids; fertilizers, artificial silk, manufacture of wood pulp.

In the laboratory typical processes, such as fuel, water and gas analysis, ordinary and fractional distillation, preparations involving incomplete chemical reaction, are studied, emphasis being laid on systematic records and interpretation of results.

Text-books—R. N. Shreve, *Chemical Process Industries;* J. R. Partington, *Inorganic Chemistry* (Macmillan).

Handbooks—Hodgman-Lange, *Handbook of Chemistry and Physics* (Chemical Rubber Co.); or Lange, *Handbook of Chemistry* (Handbook Publishing Co.).

Lectures—Tuesday and Thursday, 10-11, Ontario Hall.

Laboratory—D, *Saturday,* 9-12, first term; *Monday,* 10-12, second term;
B, *Tuesday,* 1.30-4.30.

Professor Campbell.

INDUSTRIAL CHEMISTRY IIIa

For students in Course B, fourth year, first term.

The course gives the chemist an introduction to Unit Operations. Thus heat transfer, evaporation and distillation are studied in the class room and laboratory. Many problems are solved by the student in the various subjects, and considerable emphasis is placed on the preparation of reports.

Text-books—R. N. Shreve, *Chemical Process Industries;* Badger and Baker, *Inorganic Chemical Technology;* assigned reading from Maxted, *Catalysis and its Industrial Applications;* and other publications.

Lectures—Wednesday and Friday, at 11, in Ontario Hall.

Laboratory—Monday, 1.30-4.30.

Professor Plewes and Professor Campbell.

Industrial Chemistry iv.

Research Training

For graduate students and students in Course B, fourth year, electing thesis option in Industrial Chemistry.

Professor Plewes and Professor Campbell.

Chemical Engineering i.

For students in Course D, third year.

A preparatory course in stoichiometrical and plant calculations, and in problems in Applied Physical Chemistry.

Text-books—Hodgmann-Lange, *Handbook of Chemistry and Physics* (Chemical Rubber Co.), or Lange, *Handbook of Chemistry* (Handbook Publishing Co.); Hitchcock and Robinson, *Differential Equations in Applied Chemistry* (Wiley); Lewis and Radasch, *Industrial Stoichiometry* (McGraw-Hill).

Lecture and *Laboratory—Tuesday,* 11-12, Fleming Hall; *Thursday,* 11-12, Ontario Hall, second term.

Professor Campbell.

Chemical Engineering ii

For students in Course D, fourth year.

Nitrogen fixation, sulphuric acid and fertilizer processes.

Considerable time is spent on the economic and engineering phases of the above subjects in order to emphasize the current industrial practices.

Pulp, Paper and Synthetic Plastics—Absorption principles and sulphite towers. The manufacture of mechanical and sulphite wood pulp. The Kraft or Sulphate, and the soda process, modern methods of causticising, washing, and of lime, soda and heat recovery. The manufacture of gun-cotton, cordite, nitro-cellulose powder, celluloid, viscose or artificial silk, and other synthetic colloids.

A collection of industrial products and apparatus is available for demonstration, and visits are paid to outside chemical works in the final year, at which attendance is required.

Designing of Chemical Plant. Calculations and exercises in designing chemical plant and factories. Considerations underlying the choice of materials of construction, acid proof containers and cements. Manufacturing costs as dependent on the cost of plant, raw materials, labour, etc.

Text-books—Partington, *The Alkali Industry;* Badger and McCabe, *Elements of Chemical Engineering;* Hougen and Watson, *Industrial Chemical Calculations;* Davis, *Chemistry of Explosives;* Badger and Baker, *Inorganic Chemical Technology.*

Assigned reading from Maxted, *Catalysis and its Industrial Applications;* Lunge, *Sulphuric Acid and Alkali;* and original publications.

Lectures—Tuesday, 11-12; *Thursday,* 8-9, first term; *Wednesday* and *Friday,* 11-12, second term.

Laboratory—Monday, 1.30-4.30.

Professor Plewes and Professor Campbell.

Chemical Engineering III.

For students in Course D, fourth year.

Unit Operations—A study is made of fluid flow, heat transfer, distillation, evaporation, extraction, absorption, filtration, drying, crushing and grinding.

The laboratory is a combination of unit processes and unit operations. The student uses experimental data obtained on semi-plant scale chemical engineering apparatus to determine the best working conditions for given operations.

Text-book—Badger and McCabe, *Elements of Chemical Engineering.*

Reference books—Waker, Lewis, McAdams and Gilliland, *Principles of Chemical Engineering;* Perry, *Chemical Engineers' Handbook; Handbook of Chemistry and Physics.*

Lectures—Wednesday and *Friday,* 11-12, first term; *Tuesday,* 11-12; *Thursday,* 9-10, second term.

Laboratory—Tuesday, 1.30-4.30, *Thursday,* 9-10, 11-12, first term; *Tuesday,* 1.30-5.30, *Saturday,* 9-12, second term.

Professor Plewes and Professor Campbell.

Chemical Engineering IV

For students in Course D, fourth year.

The lectures summarize the metallurgy of iron and steel and some of the more common metals. This phase of the work serves as an introduction to a detailed discussion of the theory of corrosion and the methods of preventing it.

Text-book—Speller, *Corrosion, Causes and Prevention.*

Reference text—Perry, *Chemical Engineer's Handbook.*

Lectures—Monday, 8-9, first term; *Friday,* 10-11, second term.

Professor Campbell.

Chemical Engineering v.

For students in Course D, fourth year.

The applications of thermodynamics to practical problems in Chemical Engineering.

Text—Dodge, *Chemical Engineering Thermodynamics.*

Reference Text—Weber, *Thermodynamics for Chemical Engineers.*

Lectures—Monday, 11-12, *Friday,* 9-10.

Professor Plewes.

Chemical Engineering XIII

For Graduate Students.

A graduate course which deals with distillation processes. The subject matter treats binary and multicomponent rectification, and the student is required to solve many practical problems.

The design of packed and bubble cap columns is covered in some detail. A thermodynamic study of liquid-vapour equilibria is carried out, in order to familiarize the student with the modern engineering trends in industrial design laboratories.

Lecture material is taken directly from current literature.

Lectures—At prescribed times.

Professor Plewes.

CIVIL ENGINEERING.

PROFESSOR—D. S. Ellis, B.Sc., M.A., M.C.E.

ASSOCIATE PROFESSOR—S. D. Lash, M.Sc., Ph.D.

ASSOCIATE PROFESSOR—L. F. Grant, B.Sc.

ASSISTANT PROFESSOR—R. A. Low, B.Sc., M.C.E.

ASSISTANT PROFESSOR—C. V. Armour, M.A.Sc., (on leave of absence, 1946-47).

ASSISTANT PROFESSOR—J. D. Lee, B.Sc., M.S.

LECTURERS—R. J. Kennedy, B.Sc., H. M. Edwards, B. Sc.

DEMONSTRATORS (Part time)—Ian MacLachlan, B.Sc., J. O'Dette, M.Sc., D. L. Seymour, B.Sc.

GENERAL ENGINEERING I.

For students in Courses A, B, C, D, M, second year.

This subject embraces the physical properties of materials used in the different branches of engineering and the principles involved in the theory of beams, columns, and structures.

MATERIALS OF CONSTRUCTION—Physical properties of Engineering materials and methods of testing. Commercial shapes of materials.

STRESSES IN FRAMED STRUCTURES—Analysis of stresses in roof and bridge trusses under static and moving loads.

MECHANICS OF MATERIALS—Resistance and elasticity of materials; stress and strain diagrams; bending and shearing forces; torsion in shafting; deflection of beams; columns and struts; riveted joints; centres of gravity and moments of inertia.

Text-book—Laurson and Cox, *Mechanics of Materials.*

Books of Reference—Moore, *Materials of Engineering.*

Lectures—Section 1, *Monday*, 9-10, and *Thursday*, 8-9; Section 2, *Tuesday*, 8-9, and *Friday*, 9-10.

Mr. Edwards.

GENERAL ENGINEERING II.

Theory of Structures including Graphic Statics

For students in Course E, Third Year.

This course forms the basis for the design and analysis of structures. The subjects considered include: Stresses in statically determinate framed structures, bending moments in continuous and restrained beams, elastic curves, influence lines, simple cases of redundant frameworks, combined stresses. Graphical methods of analysis are used in addition to analytical procedures.

Reference Books—Spofford, *Theory of Structures;* Shedd and Vawter, *Theory of Simple Structures.*

Lecture—Tuesday, 11-12 (a); *Wednesday*, 1.30-2.30.

Laboratory—Wednesday, 2.30-4.30. Professor Lash.

General Engineering III.

For students in Courses A, D, M, E, F, G, third year.

This course consists of practical work in the testing laboratory. Its object is to give the student a knowledge of the properties of engineering materials and of standard test methods.

The materials tested include wood, steel and other metals, and concrete.

Reference—Moore, *Materials of Engineering.*

Laboratory—Monday afternoon, alternate weeks all year. Courses A, E *and* G, 1.30-3.30; *Courses* F, D *and* M, 3.30-5.30. *(Note—Alternate Monday afternoons—Thermodynamics I.)*

Professors Lash and Lee.
Messrs. Kennedy, White and O'Dette.

General Engineering IV.

For students in Course E, fourth year.

A continuation of the work of General Engineering III. Tests are made of concrete aggregates, reinforced concrete beams, masonry units, plywood, and other structural materials.

Laboratory—Tuesday, 1.30-4.30, first term.

Professor Grant.

General Engineering V.

For students in Courses A, D, F, M, third year.

A course designed to give the non-structural student a knowledge of the fundamental principles involved in the design and detail of simple structures, in timber, steel and reinforced concrete. The theory applicable to columns, beams, slabs, riveted connections, brackets, retaining walls, trusses, trestles, water towers, and head-frames is discussed in the lectures and employed in the draughting room.

Text-books—National Lumber Manufacturers Association, *Wood Structural Data,* Vol. I; American Institute of Steel Construction, *Steel Construction;* American Concrete Institute, *Reinforced Concrete Design Handbook.*

Reference books—Young, *Structural Problems; National Building Code;* Seely, *Resistance of Materials;* George and Rettger, *Mechanics of Materials;* Parker, *Simplified Design of Roof Trusses for Architects and Builders;* Johnson, Bryan and Turneaure, *Modern Framed Structures,* Part 1.

Lectures—Wednesday, 9-10, D, F; *Wednesday,* 11-12, A, M.

Draughting—Thursday, 2.30-5.30, A, M; *Friday,* 1.30-4.30, D, F.

Professors Grant and Lee, Mr. Edwards.

General Engineering VII.

For students in Courses E, F, G, second year.

This subject is the same as General Engineering I with the addition of one lecture hour per week on Materials of Construction.

Text-book—Laurson and Cox, *Mechanics of Materials;* Moore, *Materials of Engineering.*

Lectures—Sections 1-4, *Monday* and *Friday,* 10-11, *Thursday,* 8-9; Sections 5-8, *Tuesday,* 11-12, *Wednesday* and *Thursday,* 10-11.

Professors Lash and Grant, Mr. Kennedy.

Structural Engineering I.

Elementary Structural Design.

For students in Course E, third year.

This course provides an introduction to structural design.

The materials considered are timber, steel and reinforced concrete. Attention is directed primarily to the proportioning of members such as beams and columns and to the arrangement of connections and splices.

In the draughting room students are required to design and detail structures and structural members.

Text-books—National Building Code, A.I.S.C., *Steel Construction;* Sutherland and Reese, *Reinforced Concrete Design.*

Books of Reference—U.S. Forest Products Laboratories, *Wood Handbook; Joint Committee Report—1940;* Grinter, *Design of Modern Steel Structures.*

Lectures—Tuesday, 9-10 (a), *Monday,* 9-10 (b), *Thursday,* 9-10.

Draughting—Thursday, 1.30-4.30.

Mr. Kennedy.

Structural Engineering II.

For students in Course E, fourth year.

The theory of design for continuous beams, two-way reinforcement and flat-slab construction is discussed. The fixed arch and the rigid frame are analysed by the elastic theory. The methods of slope-deflection, moment-distribution, column analogy, and model analysis are also studied. Foundations, costs and estimates of quantities are studied as a part of the problems of design in the draughting room.

In the draughting room the student is required to design bridges and buildings in accordance with prevailing specifications and check some of his results by reaction gauges.

Text-books—Sutherland and Reese, *Reinforced Concrete Design, Joint Committee Report, 1940,* and *C.E.S.A. Concrete and Reinforced Concrete, 1942, Ontario Specifications for Highway Bridges.* 1935, Taylor, Thompson, and Smulski, *Reinforced Concrete Bridges.*

Reference books—Taylor, Thompson and Smulski, *Concrete, Plain and Reinforced,* Vols. I and II; Hayden, *The Rigid Frame Bridge;* Pulver, *Construction Estimates and Costs.*

Lectures—Monday, 1.30-2.30, *Thursday,* 10-11, first term; *Tuesday,* 10-11, *Thursday,* 10-11, second term.

Draughting—Monday, 2.30-4.30, first term; 1.30-4.30, second term; *Friday,* 1.30-4.30.

Professor Lash.

Structural Engineering IV.

For students in Course E, fourth year.

Lectures—A course of lectures relating to the theory of design as applied to riveted truss highway and railway spans, arches, suspension bridges and movable spans. Deflections and secondary stresses are discussed and the methods of Single Integration, Conjugate Beams, Dummy-load, Moment Area, Slope-deflection, and Least-Work as applied to stress deformation are studied. The use of models to determine stress with deformeter gauges and polarized light is introduced. Elementary problems in applied elasticity are discussed.

Draughting room—Projects consist of the design and detail of structures studied in the lectures. Models are made of a frame that has been designed by an accepted theory and the model stressed and results compared to the analytical figures.

Text-books—Sutherland and Bowman, *Structural Design, A.I.S.C. Steel Construction,* Shedd, *Structural Design in Steel.*

Books of Reference—Johnson, Bryan and Turneaure, *Modern Framed Structures, Pt. I. and Pt. II.;* Parcel and Maney, *Statically Indeterminate Stresses.*

Lectures—Monday, 10-11 first term, *Thursday,* 11-12.

Draughting—Wednesday, 1.30-4.30, *Friday,* 10-12.

Professor Lash.

Hydraulic Engineering I.

For students in courses E, F, G, third year.

Application of hydrostatic pressure in the case of dams, gates and pipes. Flow of water and other fluids and measurement of volume by various orifices and weirs. Flow in open channels, ditches, flumes, etc., and the use and application of these conductors of water. Flow through tubes and pipes. Use of pipes as conductors of supply for domestic and power purposes. Dynamic and static pressure as applied to motors for power purposes. Study of flow of liquids other than water.

Experiments to cover above principles.

Text-books—Ellis, *Elements of Hydraulic Engineering.*

Reference books—Daugherty, *Hydraulics;* A. H. Gibson, *Hydraulics;* Addison, *Hydraulic Measurements.*

Lectures—F students, *Tuesday* and *Friday,* 9-10 (a), *Wednesday* and *Friday,* 10-11 (b) ; G students, *Friday,* 11-12, *Wednesday,* 11-12 (b), *Tuesday,* 8-9 (a) ; E students, *Thursday,* 10-11, *Friday* 11-12.

Professors Ellis and Lee.

Hydraulic Engineering II.

For students in E, F, and G, fourth year.

Comprises the study of centrifugal pumps, fans and hydraulic turbines; the elements of hydrology, the design and construction of dams and appendages; measurement, development and transmission of water power; the design of hydraulic power plants.

Problems in relation to these subjects.

Text-books—Ellis, *Elements of Hydraulic Engineering.*

Reference books — Creager and Justin, *Hydroelectric Hand Book;* Schoklitsh, *Hydraulic Structures; Air Conditioning and Engineering;* Daugherty, *Centrifugal Pumps;* Angus, *Hydraulics;* Barrows, *Water Power.*

Lectures—Monday, 10-11 and *Thursday,* 9-10, F., *Wednesday,* 8-9, *Friday,* 9-10, E. G.

Professor Ellis.

Hydraulic Engineering III.

For students in Courses E, F, G., fourth year.

Work in Hydraulics Laboratory on selected experiments dealing with hydrostatic pressure, orifice, and weir flow, flow through pipes and open channels, loss in valves and pipe fittings, efficiency tests on centrifugal pumps, and reaction and impulse turbines. Investigation of flow in draft tube. Air flow in ducts. Tests on fans. Studies on air foils, etc., in wind tunnel.

Laboratory—Wednesday, 1.30-4.30 G, first term. *Saturday,* 9-12 E, second term. F. group 1, *Tuesday,* 1.30-4.30, second term; group 2, *Thursday,* 1.30-4.30, second term.

Professor Ellis.

Hydraulic Engineering IV.

For students in Courses A, D, M, of fourth year.

Hydrostatics as applied to dams, gates, pipes, etc. Flow of water and other liquids through orifices, pipes, and channels; centrifugal pumps; hydraulic models; air flow; fans; ventilation problems on mines and buildings.

Demonstration of experiments in Laboratory.

Text-book—Ellis, *Elements of Hydraulic Measurement.*

Reference books—Montgomery, *Theory and Practice of Mine Ventilation;* Weekes, *Mine Ventilation.*

Lectures—Thursday, 10-11, (a and b); *Friday,* 8-9 (a); *Tuesday,* 10-11 (b).

Professor Ellis.

Engineering Relations

For students in Course E, fourth year.

A composite course arranged to acquaint the student with the legal relations and business methods pertaining to the engineering profession, including the essential principles of contracts and specifications, cost analysis, valuation and cost keeping, and to develop ability for proper oral and written expression and an appreciation of ethical and personal relations.

Text-book—R. W. Abbett, *Engineering Contracts and Specifications.*

Books of reference—Gillette and Dana, *Construction Cost Keeping and Management;* Fish, *Engineering Economics:* Mead, *Contracts, Specifications and Engineering Relations.*

Lecture—Wednesday, 10-11. Professor Low.

Municipal and Sanitary Engineering I.

For students in Course E, third year.

Sewerage—A study of the factors affecting the sewerage plan, methods of estimating future population, quantity of domestic sewage, rainfall and method of estimating run-off producing storm water flow, the hydraulics of sewers, the design of sewer systems, sewer appurtenances, and sewer construction.

Water Supply—A study of the quantity of water required for public supplies, sources of supply—surface and ground waters, quality of water from various sources and reliability to meet the demand, works for the collection and distribution of water.

Computations—Problems on population estimates, rainfall intensity and frequency. Design of a separate sewer system and storm water drains.

Text-books—Steel, *Water Supply and Sewerage.*

Lecture—Tuesday, 1.30-2.30.

Computing Period—Tuesday, 2.30-4.30.

Professor Lee.

Municipal and Sanitary Engineering II

For students in Course E, Fourth Year.

Water Supply—A study of the relationship of public water supplies to public health, quality of natural waters, factors affecting natural purification, sanitary surveys, interpretation of water analyses, water purification and treatment processes, works for the purification of water, the design of purification and treatment units and examination of accessory mechanical devices, operation of water purification and treatment plant units, governmental control over quality of public water supplies.

Municipal Administration—Organization of municipal governments, functions of the office of city engineer, municipal financing.

Laboratory work includes the performance of chemical and bacteriological tests on water to determine its natural quality, a study of operation of model rapid sand gravity filters and a slow sand filter, tests to determine effectiveness of treatment processes, corrective and control measures. Inspections of municipal filtration plants may be arranged.

Text-book—Steel, *Water Supply and Sewerage.*

Books of reference — Babbit and Doland, *Water Supply Engineering;* Hardenbergh, *Water Supply and Purification;* American Water Works Association, *Manual of Water Treatment;* American Public Health Association, *Standard Methods of Water and Sewage Analysis;* Turneaure & Russell, *Public Water Supplies.*

Lecture—Monday, 11-12.

Laboratory—Thursday, 1.30-4.30 (in part).

Professor Lee.

Municipal and Sanitary Engineering III

For students in Course E, fourth year.

Sewage Treatment and Disposal. A study of the characteristics and behaviour of domestic sewage, principles and processes of sewage treatment, factors governing the selection of a single process or combination of processes, the design of sewage treatment plant units and examination of accessory mechanical devices, operation of sewage treatment plant units, governmental control over installation and operation of municipal sewage treatment plants in regard to pollution of streams, lakes and other natural bodies of water.

Treatment and Disposal of Industrial Wastes.

Municipal Sanitation. A study of the methods of collection and disposal of garbage and other municipal refuse; municipal incinerators.

Laboratory work includes the performance of chemical and bacteriological tests on domestic sewage to determine its characteristics, a study of operation of model sewage treatment plant units and accessory mechanical devices, tests to determine effectiveness of treatment processes and quality of final effluent, corrective and control measures. Inspections of municipal sewage treatment plants may be arranged.

Text-book—Steel, *Water Supply and Sewerage.*

Books of reference—Babbitt, *Sewerage and Sewage Treatment;* Imhoff and Fair, *Sewage Treatment;* Hardenbergh, *Sewerage and Sewage Treatment;* American Public Health Association, *Standard Methods of Water and Sewage Analysis;* Metcalf and Eddy, *American Sewerage Practice,* Vol. III.

Lecture—Tuesday, 11-12.

Laboratory—Thursday, 1.30-4.30, (in part).

Professor Lee.

NOTE—Laboratory work in Municipal and Sanitary Engineering II and III and Highway Engineering II has been arranged for one period of three hours per week, Thursday, 1.30-4.30.

Highway Engineering and Foundations

For students in Course E, third year.

Highway Engineering covers location of highways, grading, subgrade drainage, and construction methods. Haul and the economic selection of equipment. Elementary soil mechanics and materials of construction. Problems and estimates for earth moving projects.

The Foundation section of the course covers Soil Investigations, Stress Distribution in Soils, Bearing Capacity of Soils and Stability of Slopes. Approved methods of placing foundations in poor soil, improving poor foundations, and drainage problems.

Text-books and books of reference: Hewes, *American Highway Practice;* Bateman, *Highway Engineering;* Plummer and Dore, *Soil Mechanics;* Hool and Kinn, *Foundations, Abutments, and Footings.*

Lecture—Friday, 10-11.

Laboratory—Tuesday, 1.30-4.30.

Professor Low.

Highway Engineering II.

For students in Course E, fourth year.

Development and classification of road and street types; design, methods of construction, and maintenance. Stabilization of road subgrades and surfaces. Economic selection of surface types. Treatment and design of Intersections and grade separations. Elements of traffic engineering. Highway planning, financing, and administration.

Soil Mechanics Laboratory—Materials testing; soils, aggregates and bituminous materials. Assigned problems in design of graded mixes, embankment compaction and soil stabilization.

Text-book—Bateman, *Highway Engineering.*

Books of reference—Agg, *Construction of Roads and Pavements;* Plummer and Dore, *Soil Mechanics and Foundations; Traffic Engineering Handbook; Publications,* Bureau of Public Roads and Highway Research Board.

Lecture—Wednesday, 11-12.

Laboratory—Thursday, 1.30-4.30, (in part). Professor Low.

Surveying.

All branches of Surveying receive full consideration. During the outdoor instruction students are given every opportunity to become familiar with the instruments. Notes of all field work are plotted in the draughting-room, and the rules and regulations for field work and instruments-room must be strictly adhered to. Students must be engaged in the work of a class in the hours set apart for it, otherwise their attendance will not be counted. Attendance and character of work done will be considered in the class standing.

Surveying I.

Required of all first year students.

The description, use, adjustment and care of chains, tapes, compasses, levels, transits and minor surveying equipment. Methods employed in elementary surveying.

The practical work in the field and draughting rooms is an important part of this course.

Text-book—Breed, *Surveying.*

Books of reference—Davis and Foote, *Surveying Theory and Practice;* Davis, Foote, and Rayner, *Surveying;* Breed and Hosmer, *Elementary Surveying.*

Lecture—(Field Work). Section 1, *Friday,* 1.30-3.30; Section 2, *Monday,* 1.30-3.30; Section 3, *Friday,* 10-12; Section 4, *Monday,* 10-12; Section 5, *Thursday,* 10-12; Section 6, *Wednesday,* 2.30-4.30; Section 7, *Friday,* 8-10; Section 8, *Monday,* 8-10.

Professor Grant, Messrs. Edwards and MacLachlan.

Surveying II.

For students in all courses, second year.

It continues the work of Surveying I, and includes Land Surveying—Route Surveying—profiles, circular and vertical curves, earthwork; Topographic Surveying—with stadia, plane table, hand level, and transit and level; Mine Surveying — Laying out of buildings and engineering construction. Observations for Azimuth. Errors.

Text-books—Davis and Foote, *Surveying Theory and Practice;* Breed, *Surveying.*

Lecture—A, B, C, D, M, *Thursday,* 10-11; E, F. G. Sections 1-4, *Saturday,* 10-11; E, F, G, Sections 5-8, *Tuesday,* 10-11.

Field Work and Draughting—A, B, C, D, M, *Tuesday,* 1.30-3.30; E, F, G, Sections 1-2, *Wednesday,* 9-12; Sections 3-4, *Tuesday,* 9-12; Sections 5-6, *Thursday,* 1.30-4.30; Sections 7-8, *Saturday,* 9-12.

Professor Low, Mr. Kennedy.

Surveying and Railroad Engineering

For students in Course E, third year.

Topographic methods including photo topography; Simple triangulation; Observations on izamuith and time; Land surveys and descriptions; Railroad and highway curves; Elements of track; Cross sectioning, mass curves; Tractive effort of locomotives; Length of trains; Economics of operation.

Text books—Webb, *Railroad Construction;* Davis and Foote, *Surveying.*

Lecture—Monday, 9-10.

Laboratory—Friday, 1.30-4.30.

Professor Ellis.

SURVEYING FIELD WORK

The class in surveying field work is intended to give the third year students in courses A and E an opportunity to become familiar with instruments and methods of survey under conditions approximating those of commercial work. It is prerequisite for Surveying and Railroad Engineering.

The syllabus covers field work on the following lines, simple triangulation, base lines, stadia, plane table, location of engineering structures, land boundaries and possibly soundings and stream measurements; azimuth observations on sun and polaris, mine surveying.

In rotation each student will take charge of his own party and ability to organize and direct work will in part determine his standing.

Individual copies of the notes will be prepared day by day by the note recorders of each party. These will be used later in preparing plans, etc. Observations, etc., will be worked out as taken.

The work will be carried out in the vicinity of Kingston. Transport will be arranged by the department. Students will need to carry lunches on most days. Each student will require tables, etc., and *a reading glass is compulsory.*

Students intending to take this class are required to notify the Registrar not later than August 1st.

The class work will commence at 9.00 a.m. on Monday, September 8th, and will end Saturday, September 20th.

Professors Lee and Grant, Mr. Kennedy.

THESIS.

Fourth Year students in Civil Engineering are required to submit a thesis. The purpose of the work is to provide a training in collecting data and presenting it in fair literary style.

The subject of the thesis is to be from the field of Civil Engineering and the work may be the result of summer employment, library investigation or laboratory research. The title and a provisional outline of the proposed thesis must be submitted to the Civil Engineering Department not later than October 15th, and the completed work, in approved form, handed in on or before February 15th. Printed instructions are issued to each student in the Third Year.

Wednesday, 10-11. Professor Low and Lt. Col. Walker.

LABORATORIES.

The Civil Engineering Laboratories, used principally in the third and fourth years of the Course, consist of the following units.

The Materials Laboratory occupies the whole of the basement floor of Carruthers Hall, which has recently been rebuilt. There is a large room for concrete, with bin storage for raw materials and all the equipment needed for storing and curing the specimens. It is fully equipped with scales, "Rotap" machine, screens, etc., for analyses of sand and coarse aggregate, and a small "Lancaster" mixer.

In the machine room adjacent to the concrete room. the following testing machines are placed—A Riehlé machine of 100,000 lbs., capacity, two Amsler hydraulic machines, each of 50,000 lbs. capacity, one of which has a long bed for beams, a 30,000 lbs. Olsen machine, a torsion machine of 6,000 in. lb. capacity and an Izod machine of 120 ft. lb. capacity.

A full assortment of gauges for use with these machines is available.

For examination of the hardness of metals a Brinell machine, and Shore scelerescope and a Vickers Hardness machine.

Next the machine room is a dark room for work with the Photoelasticity apparatus on stress distribution in transparent models.

The Sanitary Engineering Laboratory in its own building on the water front is outstanding. It contains equipment for a small sewage plant to treat 70,000 gallons per day, a small rapid sand gravity filter, and a slow sand filter with a combined capacity of 68,000 gallons. There is a fully equipped analytic laboratory where students may acquire laboratory technique and a knowledge of processes. At the same time they have an opportunity to test actual plant operation and correlate their information with design of treatment units.

The Highway Laboratory, which occupies part of the new Sanitary Laboratory building, is equipped to carry out the standard tests for bituminous materials and aggregates used as highway construction materials. Facilities are also provided for the analysis and classification of soils and for experiments in the field of soil stabilization.

The Hydraulics Laboratory occupies its own building in the University Grounds. In the basement is a large tank and flume from which water may be pumped to any of the equipment. The equipment of the laboratory comprises four centrifugal pumps, and a Francis and Impulse turbine, two open channels for weirs and the usual pipe racks and orifice equipment. On the main floor of the same building is the Air Laboratory in which are two large and two small fans, with ducts of various sizes. A two foot open throat wind tunnel with balance is used for aerodynamic experiments.

Several sensitive gauges are available for measurement of low velocities.

ELECTRICAL ENGINEERING.

Professor—D. M. Jemmett, D.C.M., B.Sc., M.A.

Associate Professor—H. H. Stewart, B.Sc., M.S.

Assistant Professor—H. S. Pollock, M.Sc.

Demonstrators—E. A. C. Symons, B.Sc., G. F. Spencer, B.Sc., J. R. DuMoulin, B.Sc., C. E. Marshall, B. Sc.

Electrecal Engineering I.

Basic Electrical Engineering

For third year students in Courses A, D, M, E.

The study of electric and magnetic circuits and circuit parameters. Single and polyphase circuits. Common systems of transmission and distribution. Generated electromotive force and motor torque. Elementary theory of direct and alternating current generators and motors. The transformer. Survey of electronics with some applications.

Lectures—A, D, M, *Monday,* 10-11 (a); *Monday,* 9-10 (b); *Friday,* 9-10.
E, *Monday,* 11-12 (a); *Tuesday,* 9-10 (b); *Thursday,* 8-9 (a); *Friday,* 10-11 (b).

Laboratory—D, M, *Monday,* 1.30-3.30; A, E, *Monday,* 3.30.5.30.

Professor Pollock, Mr. DuMoulin, Mr. Marshall and Mr. Spencer.

Electrical Engineering II.

For third year students in Courses G and H.

Alternating currents. The use of the complex quantity. Energy and power in A. C. circuits. The analysis of circuits containing resistance, inductance and condensance. The theory, construction and operation of the transformer. Meters and the measurement of electrical quantities.

Lectures—Monday, 9-10 (b); *Wednesday,* 9-10, and *Thursday,* 11-12.

Professor Stewart.

Laboratory—Tuesday, 1.30-4.30.

Professor Stewart, Mr. Symons, Mr. Marshall.

Electrical Engineering III.

For third year students in Course G.

The electric and magnetic circuits, hysteresis and hysteresis loss. Measurement of magnetic quantities. Some simple transients. Theory of direct current generators and motors. Series, shunt and compound machines. Energy losses, efficiency and commutation, methods of control, storage batteries. Application of direct current in commercial work. Illumination and photometry.

Lectures—Monday and *Friday,* 9-10 (a); *Tuesday* and *Thursday,* 10-11 (b); *Wednesday,* 11-12 (a).

Professor Jemmett.

Laboratory—Saturday, 9-12.

Professor Jemmett, Mr. Symons, Mr. Marshall.

Electrical Engineering IV.

For third year students in Course F.

The electric and magnetic circuits. Continuous-current meters. The theory and operation of shunt, series, and compound direct current generators and motors. Special machines. Transmission and distribution. Storage batteries.

Lectures—Monday, 9-10 (a); *Wednesday,* 8-9 (a); *Tuesday,* 10-11 (b); *Thursday,* 8-9 (b).

Laboratory—Thursday and *Friday,* 9-11.

Professor Pollock, Mr. DuMoulin, and Mr. Spencer.

Electrical Engineering V.

For fourth year students in Course G.

Theory of alternating current generators. Synchronous and Asynchronous Motors. Rotary Converters. Potential Regulators. Phase changing. Multiphase Systems. Transmission of power. Applications of alternating current in commercial work.

Lectures—Tuesday, 9-10, *Thursday,* 11-12; *Monday and Friday,* 11-12 (a); *Wednesday,* 11-12, *Friday,* 10-11 (b).

Professor Jemmett.

Laboratory—Thursday, 1.30-4.30; *Friday,* 1.30-4.30.

Professor Jemmett and Mr. Spencer.

Electrical Engineering VI.

For third year students in Courses G and H.

Properties of electrons and their dislodgement from atoms of vapours, gases and solids. Physics of thermonic vacuum tube. Photo electricity. Gaseous rectifiers.

Lectures—Tuesday, 9-10 (a); *Thursday,* 10-11 (a).

Laboratory—Sect. 1, *Friday,* 1.30-3.30, (b), Sect. 2, *Friday,* 3.30-5.30 (b).

Professor Pollock and Mr. DuMoulin.

Electrical Engineering VII.

For fourth year students in Course F.

Fundamental principles of alternating-current circuits. Single phase and polyphase circuits. Study of the alternating-current generator, the transformer, the induction motor, the synchronous motor, single-phase motors, and rectifying devices.

Lectures—Monday, 11-12; *Wednesday,* 1.30-2.30. Professor Stewart.

Laboratory—Wednesday, 2.30-4.30. Professor Stewart and Mr. Lee.

Electrical Engineering VIII.

For fourth year students in Courses G and H.

Exact solution of transmission lines in the steady state. The general differential equation. Solution in hyperbolic functions. Free, grounded and loaded lines. Nominal and Equivalent π and T lines. Constant voltage systems. Theory of Filters. Use of complex circular and hyperbolic tables and charts. Solution of power and telephone lines.

Lecture—Monday, 10-11.

Laboratory—Tuesday, 1.30-4.30, (a); *Wednesday,* 1.30-4.30 (b).

Professor Jemmett.

Electrical Engineering IX.

For fourth year students in course G (power option).

This course includes the general principles underlying radio communication and the industrial application of electronics. Some of the topics covered are: amplifiers, oscillators, modulators (AM and FM.), detectors, receivers, polyphase rectifiers, inverters and protective relays.

Lectures—Wednesday, 10-11; *Friday,* 10-11 (a); *Monday,* 11-12 (b).

Laboratory—Saturday, 9-12 (a); *Tuesday,* 2.30-5.30 (b).

Professor Pollock and Mr. Spencer.

Electrical Engineering X.

For fourth year students in Course G (power option).

Design and Calculation of performance of transformers, generators and motors.

Lecture—Tuesday, 11-12 (a), *Friday,* 11-12 (b).

Professor Jemmett.

Draughting Room—Monday, 1.30-4.30.

Electrical Engineering XI.

For fourth year students in Courses G and H (communication option).

The elements of ultra-high frequency radio engineering.

Lecture—Tuesday, 11-12 (a), 10-11 (b).

Laboratory—Monday, 1.30-4.30.

Professor Stewart and Mr. Symons.

Electrical Engineering XII.

For fourth year students in Courses G and H (communication option).

The principles of radio communication. Theory and design of amplifiers, oscillators, modulators, demodulators, and rectifiers. High frequency transmission lines and antenna. Propogation of waves.

Lectures—Wednesday, 10-11; *Thursday,* 10-11. Professor Stewart.

Laboratory—Saturday, 9-12.

Professor Stewart and Mr. DuMoulin.

Electrical Engineering Laboratories

Laboratories 1 to 6 are equipped with standard types of direct and alternating machines of all ordinary types, with the necessary auxiliary equipment and a large range of all kinds of meters for complete electrical and mechanical characteristics.

Laboratories 7 and 8 contain all the necessary equipment for radio in all its phases.

Laboratory 9 is for the study of electronics and protective relays.

Laboratories 11 to 14 house the radio station CFRC, its control room, and two studios.

Power is available from the University plant at 230/115 volts D. C., and from the Public Utilities 3 phase 60 cycles 2,220 volt supply.

Mechanical Engineering

Professor—H. G. Conn, O.B.E., B.Sc., M.S.

Lecturer—W. D. Gilbert, B.Sc., S.M.

Lecturer—J. V. McKenna, B.A.Sc.

Special Lecturers—C. R. Engler, B.Sc., B. B. Denyes, B.Sc.

Instructors—W. B. Nobes, B.Sc., C. L. Evans, B.Sc.

Laboratory Technician—J. W. Dawson.

Machine Shop—D. J. Girling, J. A. Girling.

Welding Shop—C. Brown.

Mechanical Engineering I.

Elements of Machine Design

For students in Courses F and G, third year.

This course covers the following: characteristics and properties of materials used in machine industries and selection of materials; stress analysis; principles covering design for strength, safety, rigidity, endurance; analysis of stresses in and design of fastenings, shafts, couplings, clutches, fly wheels, welded joints; springs, design of journal and plain surface thrust bearings; selection of ball and roller bearings.

Text-book—Faires, *Design of Machine Elements.*

Handbook—*Kent, *Design Shop Practice OR Mark's Mechanical Engineer's Handbook.*

* Will be stocked at the Technical Supplies.

Lectures—Section F, *Monday,* 10-11; *Tuesday,* 11-12 (a); *Wednesday,* 11-12 (b).

Section G, *Monday,* 8-9; *Thursday,* 10-11 (a); *Friday,* 9-10 (b).

Mr. J. V. McKenna.

Mechanical Engineering II.

Transmission of Power and Machinery

For students in Courses F, G, third year.

The work in this class consists of analyses of stress and design of power transmission systems, comprising belt, rope, chain and gear drives; study of couplings, friction clutches and brakes. Dynamics of Machinery including speed fluctuations in machinery, kinetic energy of machines, inertia, proper weights of flywheels, accelerations in machines and their effects. Distributing forces: stresses due to inertia, balancing of machinery.

Text-books—Faires, *Design of Machine Elements;* Angus, *Theory of Machines.*

2nd Term only— Lectures— Section F, *Tuesday,* 11-12; *Wednesday and Saturday,* 8-9. Section G,*Monday,* 10-11; *Tuesday,* 10-11; *Wednesday,* 9-10.

Mr. Gilbert.

Mechanical Engineering III.

Practical Machine Design

For students in Course F, third year.

This course is a practical application of the work taught in Mechanical Engineering I and II.

This course also covers a study of tool design and basic production processes. It treats of unit production, batch production, mass production, interchangeable manufacturing and the tools and processes of each; tolerances and allowances. The course also covers the basic operations of pattern making, moulding, forging, pressing, stamping, spinning and metal cutting. Also included are the basic operations of a typical process industry.

Lectures—Wednesday, 1.30-4.30 (a); *Tuesday,* 1.30-4.30 (b).

Laboratory—Thursday, 1.30-4.30 (a); *Friday,* 1.30-4.30 (b).

Mr. McKenna, Mr. Evans.

Mechanical Engineering IV.

Elementary Heat Engineering

For students in Courses A, E, and G, fourth year.

This course is largely of a descriptive character, and is intended to give the general idea of Heat Engineering to students not taking the Mechanical Engineering course. It comprises instruction in the parts of steam power plants and their functions, the use of compressed air, the use of internal-combustion engines as power plants, the principles of heating, ventilating and air-conditioning, and the principles of fans, blowers and pumps.

Lectures—Thursday, 9-10, and *Tuesday,* 10-11 (a), 1.30-2.30 (b).

Professor Conn.

Mechanical Engineering V.

Advanced Machine Design

For students in Course F, fourth year.

This course covers a more intensive treatment of Machine Design and the theory and evaluation of stress. It includes studies of the following: theory and design of curved beams, crane hooks and curved frames; eccentricity of loading; struts and tie-bars axially and transversely loaded; mining machinery such as mine hoists, cars, skips, and conveying equipment; auto-

mobile parts; spiral and worm gearing; manufacturing processes and methods; aeroplane design including a brief study of the principles of Aeronautics and Aerodynamics necessary to understand the principles of flight.

Text-books—The general texts are the same as those listed in Mechanical Engineering I. Aeroplane Text—Wood, *Technical Aerodynamics.*

Lectures—Monday, 1.30-2.30 (a); *Tuesday,* 10-11 (a); *Wednesday,* 8-9 (a). *Wednesday, Thursday, Friday,* 11-12 (b).

Laboratory—Monday, 2.30-5.30; *Tuesday,* 1.30-4.30 (a).

Mr. Gilbert, Mr. Engler.

Mechanical Engineering VI.

Design of Power Plants, Heating, Ventilating and Refrigeration.

For students in Course F, fourth year.

This course is the continuation of Thermodynamics V, in so far as steam power plants are concerned, and in this respect deals with the more advanced study of steam cycles, the selection of condensers and exhaust pressures, the selection of boiler and stoker types and of pressures and temperatures. It deals also with the study of re-heating and regenerative cycles, binary-vapor cycles, feed-water treatment and heating, the use of economisers and air heaters, the layout of power stations, etc. The economic aspect of the problem is emphasized throughout.

The course also includes the principles and practices of heating, ventilating and air-conditioning and the practical applications of refrigerating and ice-making machinery.

Text-books—Gaffert, *Steam Power Stations;* Allen and Walker, *Heating, Ventilating and Air Conditioning.*

Lectures—Tuesday, 11-12 (a), and *Wednesday,* 10-11.

Professor Conn.

Mechanical Engineering VII.

Practical Machine Design.

For students in Course G, third year.

This course is a practical application of work taken up in Mechanical I which Course is a prerequisite of this course.

Draughting—Thursday, 1.30-4.30. Mr. McKenna, Mr. Evans.

Mechanical Engineering VIII.

Fuel Testing.

For students in Course F, fourth year.

This course comprises the testing, by standard methods, of solid, liquid and gaseous fuels, to obtain proximate analyses and calorific values. It also includes standard distillation tests of volatile fuels, and standard tests of lubricants, and the analysis of flue-gases and internal-combustion engine exhausts.

Laboratory—Saturday, 9-12.

Mr. Gilbert.

Mechanical Engineering IX.

Kinematics of Machinery

For students in Courses E, F, and G, second year.

This course treats of the theory of mechanisms and the kinematics of machinery. It also includes a treatment of the fundamental principles pertaining to the design of spur gears, gear trains and the proportioning of speeds with gears.

Text-book—Angus, *Theory of Machines.*

Lectures—Sections 1-4, *Monday,* 8-9; Sections 5-8, *Saturday,* 8-9.

Drafting—Sections 1-2, *Tuesday,* 10-12; Sections 3-4, *Monday,* 1.30-3.30; Sections 5-6, *Tuesday,* 3.30-5.30; Sections 7-8, *Wednesday,* 1.30-3.30.

Mr. Denyes, Mr. Evans.

Mechanical Engineering X

Industrial Management

For students in Course F, fourth year.

This course includes lectures in the historical background of industrial administration and management; organizational development and types; plant location, layout and construction; materials, handling, inspection; production development, simplification and standardization; production planning; time and motion study; budgetary control; payment of labour and basic employer-employee relationships.

Also included are draughting room exercises on factory planning and layout.

Lectures—Draughting Room—*Friday,* 10-12 (a); *Tuesday,* 11-12 (b).
Friday, 10-11. (b).

Mr. McKenna.

Mechanical Engineering XI.

Internal Combustion Engines.

For students in Course F, fourth year.

This course consists of lectures on the basic theory of operation of all types of internal-combustion engines, and study of the effects on theoretical performance of practical design limitations. The methods of design of combustion spaces, valves and valve gear, ignition systems, carburetors, fuel pumps, etc., are also included.

Text-book—Lichty, *Internal Combustion Engine.*

Lectures—Wednesday and *Thursday,* 11-12 (a); *Tuesday,* 10-11 (b); *Friday,* 9-10 (b).

Professor Conn.

Mechanical Engineering XII.

A short course in the Elements of Machine Design for third year D and M students, and covering in general selected suitable portions of Mechanical Engineering I.

Lectures—Friday, 8-9 (a); *Tuesday,* 8-9 (b).

Draughting—Wednesday, 1.30-4.30 (b).

Mr. McKenna.

Thermodynamics I.

Elementary Engineering Thermodynamics

For students in Courses A, D, M, E, F, and G, third year.

This course includes a study of the following: thermodynamic media and their co-ordinates, energy factors, the energy equation, thermodynamic processes, properties of media and processes, mixtures of media, availability of energy, thermodynamic cycles.

Text-book—Lichty, *Thermodynamics.*

Lectures—A, D, M, E, F, *Monday,* 8-9; G, *Monday,* 10-11 (a); *Friday,* 8-9 (b).

Laboratory—Monday, 1.30-5.30 (in accordance with group and period arrangements as shown under General Engineering III.)

Professor Conn.

Mr. Gilbert, Mr. Nobes.

Thermodynamics II.

Advanced Thermodynamics

For students in Course D, fourth year.

This course includes lectures and laboratory work in Applied Thermodynamics, in continuation of Thermodynamics I. The subjects covered include the flow of vapours and gases through pipes, nozzles, and orifices, the theory and practice of heat transfer, the application of thermodynamics to the study of practical methods of air compression, the application of thermodynamics to the study of refrigeration systems, and the thermodynamics of certain chemical processes in industry.

Text-book—Emswiler & Schwartz, *Thermodynamics.*

Lectures—Tuesday, 9-10, and *Wednesday,* 8-9.

Laboratory—Wednesday, 1.30-4.30 (a).

Professor Conn and Mr. Nobes.

Thermodynamics III.

Advanced Thermodynamics.

For students in Course F, fourth year.

This course is a continuation of Thermodynamics I, and includes lectures and laboratory work on the flow of vapours and gases through pipes, nozzles and orifices, flow through turbine blading, the principles of design of various types of steam turbines, the thermodynamics of steam-engine cycles, engine efficiencies, the use of Steam Tables and Diagrams in the solution of problems, the application of thermodynamics to the study of practical methods of air compression, the application of thermodynamics to the study of refrigeration systems.

Steam tables.

Reference works in the library.

Lectures—Tuesday, 8-9; *Thursday,* 10-11.

Professor Conn.

Thermodynamics IV.

Advanced Thermodynamic Laboratory Work.

For students in Course F, fourth year.

This course consists of tests on steam engines, steam turbines, and internal-combustion engines both gasoline and oil burning, also tests on complete steam-generating plant.

Text-books—A.S.M.E. Proceedings and Bulletins; Reference works on testing.

Laboratory—Monday, 1.30-2.30 (b); *Thursday,* 1.30-4.30 (a); *Friday,* 1.30-4.30.

Professor Conn, Mr. Nobes, Mr. McKenna, Mr. Evans.

Thermodynamics V.

Elementary Power Plant Engineering.

For students in Course F, third year.

This course is a study of the fundamental principles underlying the design, construction, and operation of steam power plant equipment, in which reciprocating steam-engines are used for the generation of power. The marine power plant, particularly that of the merchant marine vessel, is included, together with land installations. The course includes intensive studies of steam-engines, both simple and multiple, steam boilers, feed water heaters, condensers, pumps, automatic regulating gear, steam piping and miscellaneous equipment, fuels and combustion, stokers, steam plant measuring instruments and equipment.

The course treats at length of the losses in the operation of steam-engines and plants, the causes of such losses and means of loss reduction, mathematical solutions for optimum conditions of length of steam admission, compression, back pressure and engine speed, and maximum economy of steam consumption.

Text-book—MacNaughton, *Elementary Steam Power Engineering.*

Lectures—Wednesday, 10-12 (a) ; *Thursday,* 8-9 (a) ; *Tuesday,* 9-10 (b) ; *Monday,* 11-12 (a and b).

Labs—Tuesday, 1.30-3.30 (a) ; *Thursday,* 1.30-3.30 (b).

Professor Conn, Mr. Gilbert.

Thermodynamics Laboratory

The Thermodynamics Laboratory is located at the Central Heating Plant on King Street. The Internal Combustion Engine section is equipped with a four cylinder high speed automotive type Diesel engine of modern design, two eight cylinder automobile engines of different designs, a single cylinder Diesel engine of nine horsepower and a motor-driven air compressor of fifty cubic feet capacity, two sectionalized automobile chassis of different makes. All engines are furnished with the necessary power-measuring brakes and other instruments for complete testing procedures. It is expected that two standard C.F.R. Test Engines, one for gasoline and the other for oil, will be added shortly.

The steam section includes two small steam turbines, one Uniflow engine, and one simple steam-engine. A surface condenser, with the necessary equipment for measuring cooling-water and steam quantities, is installed so that it can work in conjunction with any of the engines. Equipment is also installed for the measurement of flow, etc., of steam or air through nozzles, orifices, Venturi tubes and so on. Steam is provided from the boilers of the Central Heating Plant, the equipment of which is also available for demonstration and test purposes.

SHOP WORK

For students in Courses E, F. and G, second year; Course F, third year; Course D, fourth year.

Students in courses F and G shall enter any commercial works approved by the School and take a special course of shop training extending over a period of thirty-six weeks (18 weeks between second and third, and 18 weeks between third and fourth college years); or, in case accommodation cannot be secured, they shall attend a special course in the workshops of the school, extending over a period of 8 weeks (4 weeks preceding their third college year and 4 weeks preceding their fourth college year).

A complete forge shop forms part of the equipment, so that efficient instruction can be given in machine shop practice, and in blacksmithing. The forge shop is located in the basement of the workshop building, and is equipped with the latest type of down draft forges, and electric drive for the blower and exhauster.

In connection with the work in blacksmithing a short course is now given in cutting and welding by the Oxy-Acetylene process. Five welding tables and one cutting bench have been installed and completely equipped with the most modern torches and other apparatus supplied by the Dominion Oxygen Company. Instruction is also given in electric welding.

Students in all courses will be given a course of practical work in workshops of the School as per schedule of courses.

Work Shop—Second Year E, F, G,—Section 1, *Tuesday,* 3.30-5.30; Section 2, *Friday,* 3.30-5.30; Section 3, *Wednesday,* 1.30-3.30; Section 4, *Thursday,* 1.30-3.30; Section 5, *Wednesday,* 3.30-5.30; Section 6, *Monday,* 3.30-5.30; Section 7, *Monday,* 1.30-3.30; Section 8, *Tuesday,* 1.30-3.30.

Third Year, F, *Saturday,* 8-11 (a), 9-12 (b).

Fourth Year, D, *Friday,* 1.30-4.30, second term.

DRAWING

Professor—A. Jackson, B.Sc.

Assistant Professor—H. J. Styles, B.Sc.

Lecturers—H. I. Marshall, M.Sc., A. O. Monk, B.Sc.*

Instructors—W. G. Stinson, B.Sc., D. R. Campbell, B.Sc.*

Demonstrators—J. Billingsley, A. Morse, L. H. Shibley, B.Sc., C. E. Campbell*, G. W. Sovereign*, W. D. Vetter*.

All drawings are to be drawn in the drafting room assigned. Drawings made by the students are considered the property of the department.

* Instructor at the Special Session for Veterans during the summer of 1946.

DRAWING I.

For all first year students.

Each student at the opening of the term must provide himself with a set of drawing instruments of approved standard.

The class standing will be determined by the term's work, together with term examinations.

The work will consist of freehand orthographic and pictorial sketching, and lettering, instrumental geometrical drawings, auxiliary views, sections, pictorial drawings, fasteners, dimensioning, working drawings, assembly drawings, tracing, checking and blue printing. Also work in projection, involving true lengths of lines and size of planes, true slope of line and planes, developed surfaces and shop terms.

Text-books—French's *Engineering Drawing;* Svensen, Schumann, and Street, *Drafting Problem Layouts.*

Section 1, *Tuesday* and *Saturday,* 9-12; Section 2, *Tuesday* and *Thursday,* 9-12; Section 3, *Monday,* 9-12, and *Tuesday,* 1.30-4.30; Section 4, *Friday,* 9-12, and *Tuesday,* 1.30-4.30; Section 5, *Wednesday,* 9-12, and 2.30-5.30; Section 6, *Wednesday,* 9-12, and *Thursday,* 1.30-4.30; Section 7, *Monday,* 2.30-5.30, and *Friday,* 2.30-5.30; Section 8, *Monday,* 2.30-5.30, and *Friday,* 2.30-5.30.

DRAWING II.

For students in Courses A, B, C, D, and M, second year.

The work will include structural, machine, welding, and assembly drawings, detail drawings from free-hand sketches of details of machines, developed surfaces and intersections, production illustration, tracing, checking and blue-printing.

The class standing is determined by the term's work.

Text-books—French's *Engineering Drawing;* Svensen, Schumann and Street, *Drafting Problem Layouts.*

Reference Book—*A. I. S. C. Steel Construction.*

Wednesday, 1.30-4.30.

DRAWING III.

For students in Courses E, F, and G, second year.

This course is similar to that outlined in Drawing II.

The class standing is determined by the term's work.

Text-books—French's *Engineering Drawing;* Svensen, Schumann and Street, *Drafting Problem Layouts.*

Reference Book—*A. I. S. C. Steel Construction.*

Sections 1-4, *Thursday,* 9-12; Sections 5-8, *Monday,* 9-12.

Descriptive Geometry

Required of all second year students.

This class continues the work in Descriptive Geometry which was taken in the class in Drawing I. and includes solution of problems dealing with perpendiculars to lines and planes, intersections of planes and solids, common perpendiculars to two lines, dihedral angles, angle between line and a plane, tangent planes, revolution of lines and planes, perspective drawing, locus of a line, and mining and guide pulley problems.

Text-book—Warner, *Applied Descriptive Geometry.*

A. B. C. D. M. Section 1. *Friday,* 10-12; Section 2. *Saturday,* 10-12. E, F. G, Sections, 1-2; *Monday,* 1.30-3.30; Sections 3-4, *Wednesday,* 9-11; Sections 5-6, *Tuesday,* 1.30-3.30; Sections 7-8, *Thursday,* 1.30-3.30.

PHYSICAL EDUCATION

Medical Officer: Dr. P. M. Macdonnell.

Instructor: John F. Edwards, B.A.

Each first year student is given a careful examination by the Medical Officer at the beginning of his college course, the appointments being made on the day of registration. Corrective and remedial work is then given in the gymnasium when it is needed by the students.

With the exception of those excused by the Medical Officer because of ill-health, all first year civilian students are required to take two hours of gymnasium work per week during the whole of the school year. The time-table for such classes is posted in the gymnasium very soon after registration and these classes may be taken voluntarily by any registered sophomore, junior, or senior in good standing. The work varies throughout the year and as much time as possible is spent outdoors in the early Fall and Spring. This consists of touch football, cross-country running, track and field, and softball, while every student is given a swimming test and the non-swimmers are automatically placed in an instruction group.

Indoor work follows with cooler weather and consists of swimming, calisthenics, marching, setting-up exercises, and apparatus work on the parallel bars, the horse, the mats, and the horizontal bar. The winter term brings basketball, indoor softball, group games, and indoor track and field. Each student is encouraged to learn something about all of these activities and a wide variance of exercise is achieved.

Equivalent credit is given for attendance at regular organized swimming and life-saving classes, C.O.T.C. and U.N.T.D. training, and for playing on university teams in track, football, basketball, hockey, water polo, gymnastics, tennis, and boxing and wrestling. Such credit TERMINATES WITH THE REGULAR SCHEDULED PROGRAMME OF ACTIVITIES OF EACH RESPECTIVE CLUB, when students will rejoin the weekly gymnasium classes or engage in any other of the sports listed above.

All first-year civilian students, regardless of any equivalent credit they expect, should report at the opening classes in Physical Training. Consult the Timetable in the Gymnasium.

FELLOWSHIPS AWARDED IN THE FACULTY OF APPLIED SCIENCE, 1946

The Cominco Fellowship—J. H. O'Dette, Brockville, Ontario.

The Inco Scholarship—D. H. Yardley, Victoria, British Columbia.

The C.I.L. Fellowships—F. W. Southam, Timmins, Ontario; A. G. Moreton, Windsor, Ontario.

The Reuben Wells Leonard Resident Research Fellowships—D. F. Hewitt, Hamilton, Ontario; L. R. Klinck, Elmira, Ontario.

DEGREES AWARDED IN THE FACULTY OF APPLIED SCIENCE, 1946

Name	Address

Master of Science

Abraham, E. M., B.Sc.	Sudbury, Ontario
*Bannard, R. A. B., B.Sc.	Ottawa, Ontario
Burgess, B. W., B.Sc.	Ottawa, Ontario
*Davis, W. H., B.Sc.	Brockville, Ontario
Fawley, A. P., B.A.Sc.	Peachland, British Columbia
*Fenton, S. W., B.Sc.	Ottawa, Ontario
Follows, A. G., B.Sc.	Cornwall, Ontario
*Graham, E. S., B.Sc.	Kingston, Ontario
*Hames, F. A., B.S.	Ottawa, Ontario
Marshall, H. I., B.Sc.	Ravenna, Ontario
McTaggart, K. C., B.A.Sc.	Kingston, Ontario
O'Dette, J. H., B.Sc.	Brockville, Ontario
*Ramella, A., B.Sc.	Welland, Ontario
*Thomas, H. P., B.Sc.	Britannia Bay, Ontario

Bachelor of Science (Honours)

Brown, F. S.	Windsor, Ontario
Cahn, A.	Detroit, Michigan
Campbell, E. E.	Kingston, Ontario
Fairhall, A. W.	Hamilton, Ontario
Gramoli, L.	Cobalt, Ontario

Name	Address
Hayhurst, W. L.	Jasper, Alberta
Hopkins, A. B.	Hamilton, Ontario
Keough, J. E.	Norwich, Ontario
Klinck, L. R.	Elmira, Ontario
Lillie, A. B.	Wallaceburg, Ontario
Miura, J. H.	New Denver, British Columbia
Ratledge, J. P.	Quesnel, British Columbia
Soden, J. W.	Hamilton, Ontario
Southam, F. W.	Timmins, Ontario
Whyte, G. N.	Ottawa, Ontario

Bachelor of Science

Allison, R. S.	Enterprise, Ontario
Armstrong, J. E.	Cobalt, Ontario
Bechtel, W. H.	Kitchener, Ontario
Beckett, W. D.	Fort William, Ontario
*Benner, R. I.	Cobalt, Ontario
Bennett, L. M.	Cobourg, Ontario
Betts, V. A.	Niagara Falls, Ontario
Bigham, R. H.	Ingersoll, Ontario
Bingeman, J. B.	Waterloo, Ontario
Bird, C. G. W.	Ottawa, Ontario
Botham, J. C.	Ottawa, Ontario
Burello, M. A.	Hamilton, Ontario
Burks, W. G.	Springfield, Ontario
Carothers, D. R.	Toronto, Ontario
Carroll, R. H.	Tamworth, Ontario
Carter, R. A.	Kapuskasing, Ontario
Catchpole, G. M.	Niagara Falls, Ontario
Chalmers, H. M.	Bathurst, New Brunswick
Church, J. W.	Renfrew, Ontario
*Chwedchuck, L.	Welland, Ontario
Cottee, J. F.	Ottawa, Ontario
Cox, G. C.	Ottawa, Ontario
Crober, O. C.	Morrisburg, Ontario

Name	Address
Darling, R. G.	Clandeboye, Ontario
Davies, T.	Oshawa, Ontario
*Dean, L. A. S.	Caledonia, Ontario
Dick, W.	Cardston, Alberta
*Dorrance, D. R.	Sault Ste. Marie, Ontario
Douglas, D. H. C.	Ottawa, Ontario
Dumoulin, J. R.	Kapuskasing, Ontario
*Dymond, D. M.	Ottawa, Ont.
Elliott, M. G. S.	Ottawa, Ontario
Evans, C. L.	Belleville, Ontario
Finlayson, D. E.	Kingston, Ontario
Franz, K. K.	Hamilton, Ontario
Frappier, F. H.	Ottawa, Ontario
*Freeman, R. G.	Yarker, Ontario
Fulcher, E. L.	St. Mary's, Ontario
Fuller, R. W.	Riverside, Ontario
Gauvin, M. J.	Ottawa, Ontario
*Gibson, J. M. D.	Kingston, Ontario
Goddard, R. W.	Sudbury, Ontario
Gosh, E.	Toronto, Ontario
Gourley, A. L.	Peterborough, Ontario
Hansen, C. S.	Keewatin, Ontario
Harrison, G. A.	Picton, Ontario
Haughton, R. N. E.	Hamilton, Ontario
Haycraft, A. F.	Renfrew, Ontario
Heale, T. R.	Kingston, Ontario
Heartz, Dorothy J.	Montreal, Quebec
Hector, G. I.	Hamilton Beach, Ontario
*Haridge, P. A.	Kingston, Ontario
Holland, F. V.	Valleyfield, Quebec
Hood, J. E.	Gananoque, Ontario
Hovey, F. L.	Clinton, Ontario
Howe, D. L.	Athens, Ontario
James, F. E.	Montreal, Quebec

Name	Address
*Kane, J. J.	Kingston, Ontario
Keyser, G. M.	Kingston, Ontario
King, P. D.	Brantford, Ontario
Kraft, T. C.	Kitchener, Ontario
*Lawson, R. H.	Wallaceburg, Ontario
Lee, T. B. K.	Montreal, Quebec
Leitch, H. C. B.	Toronto, Ontario
Lemiski, W.	Fort William, Ontario
*Major, W. J.	Espanola, Ontario
Mills, J. F.	Kingston, Ontario
Mitchell, K. M.	Kamsack, Saskatchewan
*Modesto, N.	Coniston, Ontario
*Morrow, J. G.	Copper Cliff, Ontario
Mowbray, J. F.	Stoney Creek, Ontario
McCaffrey, B. I.	Ottawa, Ontario
MacGregor, W. R.	Hamilton, Ontario
*McKnight, R. M.	Kingston, Ontario
McLellan, R. M.	Kirkland Lake, Ontario
McLeod, H. D.	Kingston, Ontario
Nelson, J. E.	Portsmouth, Ontario
Newell, R. G.	Perth, Ontario
Nobes, W. D.	Kingston, Ontario
O'Grady, J. R.	Timmins, Ontario
Patterson, R. A.	Ottawa, Ontario
Perttula, F. A.	Geraldton, Ontario
Pfisterer, H. A.	Estevan, Saskatchewan
Provan, J. T.	Kingston, Ontario
Ramsay, D. A.	Timmins, Ontario
Redick, J .A.	Trenton, Ontario
Rothschild, K.	Montreal, Quebec
Runge, J. F.	Ottawa, Ontario

Name	Address
Scheye, K. G.	Toronto, Ontario
Scrivens, D. B.	Ottawa, Ontario
Sharpe, J. L.	Victoria, British Columbia
Smith, J. D.	Kingston, Ontario
Smith, W. C.	Kitchener, Ontario
Spencer, G. F.	Frankford, Ontario
*Steacy, H. R.	Ottawa, Ontario
Sterne, F. E.	Brantford, Ontario
Taylor, C. G.	Chatham, Ontario
Tink, R. R.	Ottawa, Ontario
Tuer, A. B. F.	Hamilton, Ontario
*Twiss, J. E. M.	Kingston, Ontario
Wagener, L. R.	Ottawa, Ontario
Walker, E. A.	Digby, Nova Scotia
White, D. K.	Cobalt, Ontario
*Whyte, J. S.	Shawinigan Falls, Quebec
Wilson, J. E.	Toronto, Ontario
Wilson, R. G.	Aylmer, Ontario
Workman, D. G.	Kingston, Ontario

*Indicates graduates of October, 1946.

FIRST YEAR—ALL COURSES

	8 a.m.	9 a.m.	10 a.m.	11 a.m.	1.30 p.m.	2.30 p.m.	3.30 p.m.	4.30 p.m.
Mon.	English I. Sect. 1 (A & B) **Phys. I.** Sects. 3-4 **Phys. II. Lab.** Sect. 5 **Surv. I.** Sect. 8	**Chem. I.** Sects. 1-2 **Draw. I.** Sect. 3 **Phys. II. Lab.** Sect. 5 **Surv. I.** Sect. 8	**Math. II.** Sects. 1-2 **Draw. I.** Sect. 3 **Surv. I.** Sect. 4 **English I.** Sect. 5 (B) **Phys. II. Lab.** Sect. 6 **Math. II.** Sect. 8	**Phys. I.** Sects. 1-2 **Draw. I.** Sect. 3 **Surv. I.** Sect. 4 **English I.** Sect. 5 (A) **Phys. II. Lab.** Sect. 6 **Chem. I.** Sects. 7-8	**Phys. II. Lab.** Sect. 1 **Surv. I.** Sect. 2 **English I.** Sect. 3 (A & B) **Math. II.** Sects. 5-6 **Phys. I.** Sects. 7-8	**Phys. II. Lab.** Sect. 1 **Surv. I.** Sect. 2 **Chem. I.** Sects. 3-4 **Phys. I.** Sects. 5-6 **Draw. I** Sects. 7-8	**Phys. II. Lab.** Sect. 2 **Math. II.** Sects. 3-4 **Phys. II.** Sects. 5-6 **Draw. I.** Sects. 7-8	**Phys. II. Lab.** Sect. 2 **Phys. II.** Sects. 3-4 **Draw. I.** Sects. 7-8
Tues.	**English I.** Sect. 2 (A & B)	**Draw. I.** Sects. 1-2 **Math. I.** Sects. 3-5	**Draw. I.** Sects. 1-2 **Math. I.** Sects. 3-6 **Math. I.** Sect. 8	**Draw. I.** Sects. 1-2 **English I.** Sect. 4 (A & B) **Math. I.** Sect. 6 **Math. II.** Sect. 7 **Math. I.** Sect. 8	**Math. I.** Sects 1-2 **Draw. I.** Sects. 3-4 **English I.** Sect. 6 (A & B) **Chem. I.** Sects. 7-8	**Math. I.** Sects. 1-2 **Draw. I.** Sects. 3-4 **Chem. I.** Sects. 5-8	**Physical Training** Sects. 1-2 **Draw. I.** Sects. 3-4 **Physical Training** Sects. 5-6 **Chem. I.** Sects. 7-8	**Phys. II.** Sects. 7-8
Wed.	**Phys. I.** Sects. 1-2 **English I.** Sect. 3 (A & B) **Chem. I.** Sects. 7-8	**Chem. I.** Sects. 1-2 **Chem. I.** Sects. 3-4 **Draw. I.** Sects. 5-6 **Phys. I.** Sects. 7-8	**Math. II.** Sects. 1-2 **Chem. I.** Sects. 3-4 **Draw. I.** Sects. 5-6 **Math. II.** Sect. 8	**Phys. II.** Sects. 1-2 **Chem. I.** Sects. 3-4 **Draw. I.** Sects. 5-6 **English I.** Sect. 7 (A & B)	**Chem. I.** Sects. 1-2 **Phys. II.** Sects. 3-4 **Math. II.** Sects. 5-7	**Chem. I.** Sects. 1-4 **Draw. I.** Sect. 5 **Surv. I.** Sect. 6 **English I.** Sect. 8(A & B)	**Chem. I.** Sects. 1-2 **Math. II.** Sects. 3-4 **Draw. I.** Sect. 5 **Surv. I.** Sect. 6 **Phys. II.** Sects. 7-8	**Physical Training** Sect. 4 **Draw. I.** Sect. 5 **Physical Training** Sects. 6-8

FIRST YEAR—ALL COURSES

	8 a.m.	9 a.m.	10 a.m.	11 a.m.	1.30 p.m.	2.30 p.m.	3.30 p.m.	4.30 p.m.
Thurs.	**Phys. II. Lab.** Sect. 3 **Phys. I.** Sects. 5-6	**Draw. I.** Sect. 2 **Phys. II. Lab.** Sect. 3 **English I.** Sect. 4 (A & B) **Chem. I.** Sects. 5-6 **Math. I.** Sect. 7	**Draw. I.** Sect. 2 **Phys. II. Lab.** Sect. 4 **Surv. I.** Sect. 5 **Math. I.** Sects. 7-8	**Draw. I.** Sect. 2 **Physical Training** Sect. 3 **Phys. II. Lab.** Sect. 4 **Surv. I.** Sect. 5 **English I.** Sect. 6 (A & B) **Physical Training** Sect. 7 **Math. I** Sect. 8	**Math. I.** Sects. 1-4 **English I.** Sect. 5 (B) **Draw. I.** Sect. 6 **Phys. II. Lab.** Sect. 7	**Math. I.** Sects. 1-4 **English I.** Sect. 5 (A) **Draw. I.** Sect. 6 **Phys. II. Lab.** Sect. 7	**English I.** Sect. 1 (A & B) **Phys. I.** Sects. 3-4 **Physical Training** Sect. 5 **Draw I.** Sect. 6 **Phys. II. Lab.** Sect. 8	**Phys. II. Lab.** Sect. 8
Fri.	**English I.** Sect. 2 (A & B) **Surv. I.** Sect. 7	**Chem. I.** Sects. 1-2 **Draw. I.** Sect. 4 **Chem. I.** Sects. 5-6 **Surv. I.** Sect. 7	**Math. II.** Sects. 1-2 **Surv. I.** Sect. 3 **Draw. I.** Sect. 4 **Chem. I.** Sects. 5-6 **English I.** Sect. 8 (A & B)	**Phys. II.** Sects. 1-2 **Surv. I.** Sect. 3 **Draw. I.** Sect. 4 **Chem. I.** Sects. 5-6 **Math. II.** Sects. 7-8	**Surv. I.** Sect. 1 **Math. II.** Sects. 5-6 **English I.** Sect. 7 (A & B)	**Surv. I.** Sect. 1 **Chem. I.** Sects. 3-4 **Phys. II.** Sects. 5-6 **Draw. I.** Sects. 7-8	**Physical Training** Sects. 1-2 **Math. II.** Sects. 3-4 **Math. I.** Sects. 5-6 **Draw. I.** Sects. 7-8	**Draw. I.** Sects. 7-8
Sat.	**Chem. I.** Sects. 5-6	**Draw. I.** Sect. 1 **Chem. I.** Sects. 7-8	**Draw. I.** Sect. 1 **Math. I.** Sects. 5-7	**Draw. I.** Sect. 1 **Physical Training** Sects. 3-4 **Math. I.** Sect. 7 **Physical Training** Sect. 8				

SECOND YEAR

	8 a.m.	9 a.m.	10 a.m.	11 a.m.	1.30 p.m.	2.30 p.m.	3.30 p.m.	4.30 p.m.
Mon.	Mech. IX. E.F.G., 1-4 Math. V. E.F.G., 5-8	Genl. I. A.B.C.D.M., 1 Phys. III. E.F.G., 1-4 Draw. III. E.F.G., 5-8	Phys. XIV. A.B.C.D.M. Genl. VII. E.F.G., 1-4 Draw. III. E.F.G., 5-8	Math. V. A.B.C.D.M. E.F.G., 1-4 Draw. III. E.F.G., 5-8	Qual. I. (a) A. B. C. D. M., 1 Miner. I. (a) A. B. C. D. M., 2 Desc. Geom. E.F.G., 1-2 Mech. IX. E.F.G., 3-4 Phys. IV. E.F.G., 5-6 Shop Work E.F.G.. 7	Qual. I. A. B. C. D. M., 1 Miner. I. (a) A.B.C.D.M., 2 Desc. Geom. E.F.G., 1-2 Mech. IX. E.F.G., 3-4 Phys. IV. E.F.G., 5-6 Shop Work E.F.G., 7	Qual. I. A.B.C.D.M., 1 Miner. I.(b) A.B.C.D.M., 2 Phys. IV. E.F.G., 3-4 Shop Work E.F.G., 6	Qual. I. (b) A.B.C.D.M., 1 Miner. I. (b) A.B.C.D.M., 2 Phys. IV. E.F.G., 3-4 Shop Work E.F.G., 6
Tues.	Genl. I. A. B. C. D. M., 2 Math. V. E.F.G., 1-4 Phys. IV. E.F.G., 5-8	Geol. I. A.B.C.D.M. Surv. II. E.F.G., 3-4 Phys. III. E.F.G., 5-8	Phys. XIV. A.B.C.D.M. Mech. IX. E.F.G., 1-2 Surv. II. E.F.G., 3-8	Qual. I. A.B.C.D.M. Mech. IX. E.F.G., 1-2 Surv. II. E.F.G.. 3-4 Genl. VII. E.F.G., 5-8	Surv. II. A.B.C.D.M. Desc. Geom. E.F.G., 5-6 Shop Work E.F.G., 8	Surv. II. A.B.C.D.M. Desc. Geom. E.F.G., 5-6 Shop Work E.F.G., 8	Phys. XIV. A.B.C.D.M., 1 Shop Work E.F.G., 1 Mech. IX. E. F. G., 5-6	Phys. XIV. A.B.C.D.M., 1 Shop Work E.F.G., 1 Mech. IX. E.F.G., 5-6
Wed.	Miner. I. (b) A.B.C.D.M. Phys. IV. E.F.G., 1-4	Phys. XIV. A.B.C.D.M. Surv. II. E.F.G., 1-2 Desc. Geom. E. F. G., 3-4 Chem. II. E. F. G., 5-8	Miner. I. (a) A.B.C.D.M. Surv. II. E.F.G., 1-2 Desc. Geom. E.F.G., 3-4 Genl. VII. E.F.G., 5-8	Math. V. A.B.C.D.M. E.F.G., 5-8 Surv. II. E.F.G., 1-2	Draw. II. A.B.C.D.M. Shop Work E.F.G., 3 Phys. III. E.F.G., 5-6 Mech. IX. E. F. G., 7-8	Draw. II. A.B.C.D.M. Shop Work E.F.G., 3 Phys. III. E.F.G., 5-6 Mech. IX E. F. G., 7-8	Draw. II. A.B.C.D.M. Shop Work E.F.G., 5 Phys. III. E.F.G., 7-8	Shop Work E.F.G., 5 Phys. III. E.F.G., 7-8
Thurs.	Genl. I. A.B.C.D.M., 1 Genl. VII. E.F.G., 1-4	Geol. I. A.B.C.D.M. Draw. III. E.F.G., 1-4 Phys. III. E.F.G., 5-8	Surv. II. A. B. C. D. M. Draw. III. E.F.G., 1-4 Genl. VII. E.F.G., 5-8	Qual. I. A.B.C.D.M. Draw. III. E.F.G., 1-4 Phys. IV. E.F.G., 5-8	Qual. I. A.B.C.D.M., 2 Phys. IV. E.F.G., 1-2 Shop. Work E.F.G., 4 Surv. II. E.F.G., 5-6 Desc. Geom. E.F.G., 7-8	Qual. I. A.B.C.D.M., 2 Phys. IV. E.F.G., 1-2 Shop Work E.F.G.. 4 Surv. II. E.F.G., 5-6 Desc. Geom. E.F.G., 7-8	Qual. I. A.B.C.D.M., 2 Chem. II. E.F.G., 1-4 Surv. II. E.F.G., 5-6 Phys. IV. E.F.G., 7-8	Phys. IV. E.F.G., 7-8
Fri.	Miner. I. (b) A.B.C.D.M. Math. V. E.F.G., 5-8 Phys. III. E.F.G., 1-4	Math. V. A. B. C. D. M., 1 Genl. I. A. B. C. D. M., 2 Phys. IV. E.F.G., 1-4 Chem. II. E.F.G., 5-8	Desc. Geom. A.B.C.D.M., 1 Genl. VII. E.F.G., 1-4	Desc. Geom. A.B.C.D.M., 1 Math V. A. B. C. D. M., 2 Math. V. E.F.G., 1-4	Miner. I. A.B.C.D.M., 1 Qual. I. A.B.C.D.M., 2 Phys. III. E.F.G., 1-2	Miner. I. A.B.C.D.M., 1 Qual. I. A.B.C.D.M., 2 Phys. III. E.F.G., 1-2	Qual. I. A.B.C.D.M., 2 Shop Work E.F.G., 2 Phys. III. E.F.G., 3-4	Shop Work E.F.G., 2 Phys. III. E.F.G., 3-4
Sat.	Phys. XIV. A.B.C.D.M., 2 Mech. IX. E. F. G., 5-8	Qual. I. A.B.C.D.M., 1 Phys. XIV. A.B.C.D.M., 2 Surv. II. E.F.G., 7-8	Qual. I. A.B.C.D.M., 1 Desc. Geom. A.B.C.D.M., 2 Surv. II. E.F.G., 1-4 Surv. II. E.F.G., 7-8	Qual. I. A.B.C.D.M., 1 Desc. Geom. A.B.C.D.M., 2 Chem. II. E.F.G., 1-4 Surv. II. E.F.G., 7-8				

THIRD YEAR A. B. C. D. M.

	8 a.m.	9 a.m.	10 a.m.	11 a.m.	1.30 p.m.	2.30 p.m.	3.30 p.m.	4.30 p.m.
Mon.	**Thermo. I.** A.D.M. Min. III.(a) B.C. Min. II.(b) C.	**Elect. I.** A.D.M. (b) **Gen. Chem. III.** B. **Geol. II.** C. **Met. III. (a)** **M.**	**Elect. I.** A.D.M. (a) **Met. II.(b)** A.B.M. **Ind. Chem. II.** D. (b)	**Met. II.** A.B.M. **Ind. Chem. II.** D. (b)	**Genl. III.** A.E.G. **Thermo. I.** A.E.G. **Org. Chem. I.** B. Geol. X. (a) C. Geol. XI. (b) C **Elect. I.** D.M.	**Genl. III.** A.E.G. **Thermo. I.** A.E.G. **Org. Chem. I.** B. Geol. X. (a) C. Geol. XI. (b) C. **Elect. I.** D.M.	**Elect. I.** A.E. **Org. Chem. I.** B. Geol. X. (a) C. Geol. XI. (b) C. **Genl. III.** D.M.F. **Thermo. I.** D.M.F.	**Elect. I.** A.E. **German I.** B.H. Geol. X. (a) C. Geol. XI. (b) C. **Genl. III.** D.M.F. **Thermo. I.** D.M.F.
Tues.	**Min. IV.** A.C. Quant. Chem. II B. Mech. XII. (b) D.M. **Min. VII.** **M (a)**	**Mining I.** **A.** **Phys. Chem. I.** **B.C.D.M.**	**Mining I.** **A. (a)** **Geol. III. (b)** A.C. **Ind. Chem II.** **B.D.** **Met. III. (b)** **M.**	Geol. IV. (a) A. Chem. Eng. I. (b) D.	Quant. Chem. I. A., Sect. 1 **Fire Assay** M., Sect. 1 (a) Sect. 2 (b) A. (a) **Geol. III. (b)** A., Sect. 2 **Ind. Chem. II.** B. **Phys. Chem. I.** C. **Org. Chem. I.** D.	Quant. Chem. I. A., Sect. 1 **Fire Assay** M., Sect. 1 (a) Sect. 2 (b) A. (a) **Geol. III. (b)** A., Sect. 2 **Ind. Chem. II.** B. **Phys. Chem. I.** C. **Org. Chem. I.** D.	Quant. Chem. I. A., Sect. 1 **Fire Assay** M., Sect. 1 (a) Sect. 2 (b) A. (a) **Geol. III. (b)** A., Sect. 1 C. **Ind. Chem. II.** B. **Phys. Chem. I.** C. **Org. Chem. I.** D.	**Fire Assay** M., Sect. 1 (a) Sect. 2 (b) A. (a) **Geol. III. (b)** A., Sect. 1 C.
Wed.	**Met. II. (a)** **A.B.M.**	**Mining I.** **A.** **Gen. Chem. III.** **B.** **Geol. II.** C. **Genl. V.** D.F. **Met. III.** **M.**	**Mining I.** **A (a)** **Min. III.** C. (a) **Quant. Chem. I.** C.D.M.	**Genl. V.** A.M. **Min. III.** C. (a) **Org. Chem. I.** B.D.	Min. IV. A., Sect. 1 A., Sect. 2(a) C. Quant. Chem. II B. Phys. Chem I. D. (a) M (a) Mech. XII. D. (b), M. (b)	Min. IV. A., Sect. 1 A., Sect. 2(a) C. Quant. Chem. II. B. Phys. Chem I. D. (a) M (a) Mech. XII. D. (b), M. (b)	Min. IV. A.. Sect. 2(b) Quant. Chem. II B. Min. III. C.(a) Phys. Chem. I. D. (a) M (a) Mech. XII. D. (b), M. (b)	Min. IV. A., Sect. 2(b) German I. B.H. Min. III. C.(a)

(a)—First term. (b)—Second term.

THIRD YEAR A. B. C. D. M.

	8 a.m.	9 a.m.	10 a.m.	11 a.m.	1.30 p.m.	2.30 p.m.	3.30 p.m.	4.30 p.m.
Thurs.	**Min. IV. (a)** A.C. **Quant. Chem. II.** B. **Min. VII.** M. (a)	**Mining I. (b)** A. **Phys. Chem. I.** B.C.D.M.	Ore Dressing (a) A.C.M. **Geol. III. (b)** A.C. **Ind. Chem. II.** B.D.	**Ore Dressing** A.C.M. Chem. Eng. I. D (b)	**Quant. Chem. I.** A **Quant. Chem. II.** B. **Geol. VII. (b)** C. (Sect. I.) **Quant. Chem. I.** D.	**Genl. V.** A.M. **Quant. Chem. II.** B. **Geol. VII. (b)** C. (Sect. I.) **Quant. Chem. I.** D.	**Genl. V.** A.M. **Quant. Chem. II.** B. **Geol. VII. (b)** C. (Sect. 2) **Quant. Chem. I.** D.	**Genl. V.** A.M. **Geol. VII. (b)** C. (Sect. 2)
Fri.	**Geol. II.** C. **Mech. XII. (a)** D.M.	**Elect. I.** A.D.M. **German I.** B.H. **Geol. II.** C.	**Min. IV. (b)** A.C. **Min. III. (a)** B.C.	**Geol. IV. (a)** A. **Org. Chem. I.** B.D. **Min. II. (b)** C. **Org. Chem. V.** M.	**Phys. Chem. I.** B. **Quant. Chem. I.** C.M. **Genl. V.** D.F.	**Phys. Chem. I.** B. **Quant. Chem. I.** C.M. **Genl. V.** D.F.	**Phys. Chem. I.** B. **Quant. Chem. I.** C.M. **Genl. V.** D.F.	**Engineering Society**
Sat.	**Quant. Chem. I.** A., Sect. 2 **Quant. Chem. II.** B. (b)	**Quant. Chem. I.** A., Sect. 2 **Quant. Chem. II.** B. (b) **Ind. Chem. II.** D. (a) **Phys. Chem. I.** D. M. (b)	**Quant. Chem. I.** A., Sect. 2 **Min. III. (a)** B. **Quant. Chem. II.** B. (b) **Min. II. (b)** C. **Ind. Chem. II.** D (a) **Phys. Chem. I.** D. M. (b)	**Min. III. (a)** B. **Quant. Chem. II.** B. (b) **Min. II. (b)** C. **Ind. Chem. II.** D. (a) **Phys. Chem. I.** D. M. (b)				

(a)—First term. (b)—Second term.

THIRD YEAR E. F. G. H.

	8 a.m.	9 a.m.	10 a.m.	11 a.m.	1.30 p.m.	2.30 p.m.	3.30 p.m.	4.30 p.m.
Mon.	**Thermo. I.** E.F. Mech. I. G.	Struct. I. (b) E. Surv. & Railroad E. **Elect. IV. (a)** F. **Elect. III. (a)** G. **Elect. II. (b)** G.H.	**Mech. I.** F. Thermo. I. (a) G. Mech. II. (b) G.	Elect. I. (a) E. Thermo. V. F. **Phys. VII.** H. (a) Phys. VIII. H. (b)	Thermo. I. A.E.G. **Genl. III.** A.E.G. **Phys. VI. (b)** H.	Thermo. I. A.E.G. **Genl. III.** A.E.G. **Phys. VI. (b)** H.	**Elect. I.** A.E. **Genl. III.** D.M.F. **Thermo. I.** D.M.F.	**Elect. I.** A.E. **Genl. III.** D.M.F. **Thermo. I.** D.M.F. **German I.** B.H.
Tues.	**Met. I. (b)** E.F.G. Hydraulics I. (a) G. **Math. VIII.** H.	**Struct. I.** E.(a) Elect. I. (b) E. Hydraulics I. (a) F. Thermo. V. (b) F. **Elect. VI.(a)** G.H.	**Met. I. (a)** E.F.G. **Elect. IV. (b)** F. **Elect. III.(b)** G. Mech. II. (b) G. **Phys. VI. (b)** H.	**Genl. II.** E. (a) Mech. I. (a) F. Mech. II. (b) F.	High. & Found. E. Mun. and San. **I.** E. Thermo. V. (a) F. Mech. III. (b) F. **Elect. II.** G.H.	High. & Found. E. Mun. and San. **I.** E. Thermo. V. (a) F. Mech. III. (b) F. **Elect. II.** G.H.	High. & Found. E. **Mun. and San.** **I.** E. Mech. III. (b) F. **Elect. II.** G.H.	
Wed.	Elect. IV. (a) F.	Genl. V. D.F. **Elect. II.** **G.H.**	Thermo. V.(a) F. Hydraulics I. (b) F. **Math. VII.** G. H.	**Geol. IX.** E. Thermo. V. (a) F. Hydraulics I. (b) G. Mech. I. (b) F. **Elect. III.(a)** G. **Phys. VII.** H. (a) Phys. VIII. H. (b)	Genl. II. E. Mech. III. (a) F.	Genl. II. E. Mech. III. (a) F. Phys. V. (a) G.H.	Genl. II. E. Mech. III. (a) F.	 German I. B.H.

(a)—First term.

(b)—Second term.

THIRD YEAR E. F. G. H.

	8 a.m.	9 a.m.	10 a.m.	11 a.m.	1.30 p.m.	2.30 p.m.	3.30 p.m.	4.30 p.m.
Thurs.	Elect. I. (a) E. Thermo. V. (a) F. Elect. IV. (b) F. Math. VIII. H.	**Struct. I.** **E.** Elect. IV. F. Phys. V. G.H.	Hydraulics I. E. Elect. IV. F. Mech. I. (a) G. Elect. III.(b) G. Elect. VI.(a) G.H. **Phys. VI. (b)** H.	**Geol. IX.** E. **Elect. II.** G.H.	**Struct. I.** E. Mech. III. (a) F. Thermo. V. (b) F. **Mech. VII.** G. **Phys. VII.** H. (a) **Phys. VIII.** H. (b)	**Struct. I.** E. Mech. III. (a) F. Thermo. V. (b) F. **Mech. VII.** G. **Phys. VII.** H. (a) **Phys. VIII.** H. (b)	**Struct. I.** E. Mech. III. (a) F. **Mech. VII.** G.	
Fri.	Thermo. I. (b) G.	Hydraulics I. (a) F. Mech. I. (b) G. Elect. III.(a) G. German I. B.H.	High. & Found. E. Elect. I. (b) E. Elect. IV. F. Hydraulics I. (b) F. Math. VII. G. H.	Hydraulics I. E.G. **Elect. IV.** F. **Phys. VII.** H. (a) Phys. VIII. (b) H.	Surv. & Railroad. E. **Genl. V.** **D.F.** Mech. III. (b) F. Elect. VI.(b) Sect. 2 G.H. Phys. V. (b) Sect. I. **G.H.**	Surv. & Railroad. E. **Genl. V.** D.F. Mech. III. (b) F. Elect. VI.(b) Sect. 2 G.H. Phys. V. (b) Sect. I. G.H.	Surv. & Railroad. E. **Genl. V.** D.F. Mech. III. (b) F. Elect. VI.(b) Sect. 1 G.H. Phys. V. (b) Sect. 2 G.H.	**Engineering Society** Elect. VI.(b) Sect. 1 G.H. Phys. V. (b) Sect. 2 G.H.
Sat.	**Shop Work** **F. (a)** Mech. II. (b) F. Math. VIII. H.	**Shop Work** F. **Elect. III.** G.	**Shop Work** F. **Elect. III.** G. **Phys. VI. (b)** H.	**Shop Work** **F. (b)** **Elect. III.** G.				

(a)—First term. (b)—Second term.

FOURTH YEAR

	8 a.m.	9 a.m.	10 a.m.	11 a.m.	1.30 p.m.	2.30 p.m.	3.30 p.m.	4.30 p.m.
Mon.	Min. II.(b) A. (Geol. opt.) Chem. Eng. IV.(a) D. Metallography I.(a) M. Metallography II. (b) M.	Econ. I. A.B.C.D.M. E.F.G. Math. X. H.	Mining II. A. Phys. Chem. II. B.D.M. Struct. IV. (a) E. Hydraulics II. F. Elect. VIII. G.H.	Geol. VIII. A.C. Coll. Chem. II. B. (b) Chem. Eng. V. D. Mun. & San. II. E. Elect. VII. F. Elect. V.(a) G. Elect. IX. G.(b) Phys. IX. H. (a) Phys. XI. H. (b)	Mining II.(b) A. Geol. X. (a) A (Geol. Opt.) Geol. XI. (b) A (Geol. Opt.) Ind. Chem. III. B. (a) Chem. Opt. B. (b) Mining IV. C.M. Chem. Eng. II. D. Struct. II. E. Mech. V. (a) F. Thermo. IV. (b) F. Elect. X. G. Elect. XI. G.H.	Geol. X. (a) A. (Geol. Opt.) Geol. XI. (b) A. (Geol. Opt.) Ind. Chem. III. B. (a) Chem. Opt. B. (b) Geol. VI. C. Chem. Eng. II. D. Met. VII. M. Struct. II. E. Mech. V. F. Elect. X. G. Elect. XI. G.H.	Geol. X. (a) A. (Geol. Opt.) Geol. XI. (b) A. (Geol. Opt.) Ind. Chem. III. B. (a) Chem. Opt. B. (b) Geol. VI. C. Chem. Eng. II. D. Met. VII. M. Struct. II. E. Mech. V. F. Elect. X. G. Elect. XI. G.H.	Geol. X. (a) A. (Geol. Opt.) Geol. XI. (b) A. (Geol. Opt.) German I. C. Mech. V. F.
Tues.	Phys. Chem. II. B.D.M.(a) Thermo. III. F.	Met. IV. A.M. German II. B.H. Geol. VI. C. Thermo. II D. Elect. V. G.	Mining II. A. Mech. IV. (a) A.E.G. Hydr. IV. (b) A.D.M. Phys. Chem. III. B. Geol. XII.(a) C. Min. V.(b) C. Struct. II. (b) E. Mech. V. (a) F. Mech. XI. (b) F. Elect. XI. (b) G.H. Phys. X. H. (a)	Geol. VIII A.C. Org. Chem. II. B. Chem. Eng. II. (a) D. Chem.Eng.III.(b) D. Met. V. (a) M. Met. VI.(b) M.G. Mun. and San. III. E. Mech. VI. F.(a) Mech. X. (b) F. Elect. X.(a) G. Elect. XI.(a) G.H. Phys. XII. H. (b)	Mining II. (a) A. Mech. IV. (b) A.E.G. Coll. Chem. II. B. (a) Chem. Opt. B. (b) Min. V. C. Chem. Eng. III. D. Metallography I. M. (a) Metallography II. M. (b) Genl. IV. (a) E. Mech. V. (a) F. Hydr. III. (b) F. (Sect. 1) Elect. VIII. G.H. (a)	Mining II. A. Coll. Chem. II. B. (a) Chem. Opt. B. (b) Min. V. C. Chem. Eng. III. D. Metallography I (a) M. Metallography II. (b) M. Genl. IV. (a) E. Mech. V. (a) F. Hydr. III. (b) F. (Sect. 1) Elect. IX.(b) G. Elect. VIII. G.H. (a)	Chem. Opt. B. (b) Chem. Eng. III. D. Metallography I (a) M. Metallography II. (b) M. Genl. IV. (a) E. Mech. V. (a) F. Hydr. III. (b) F. (Sect. 1) Elect. IX.(b) G. Elect. VIII. G.H. (a)	Chem. Eng. III D. (b) Elect. IX.(b) G.

(a) First term (b) Second term

FOURTH YEAR

FOURTH YEAR

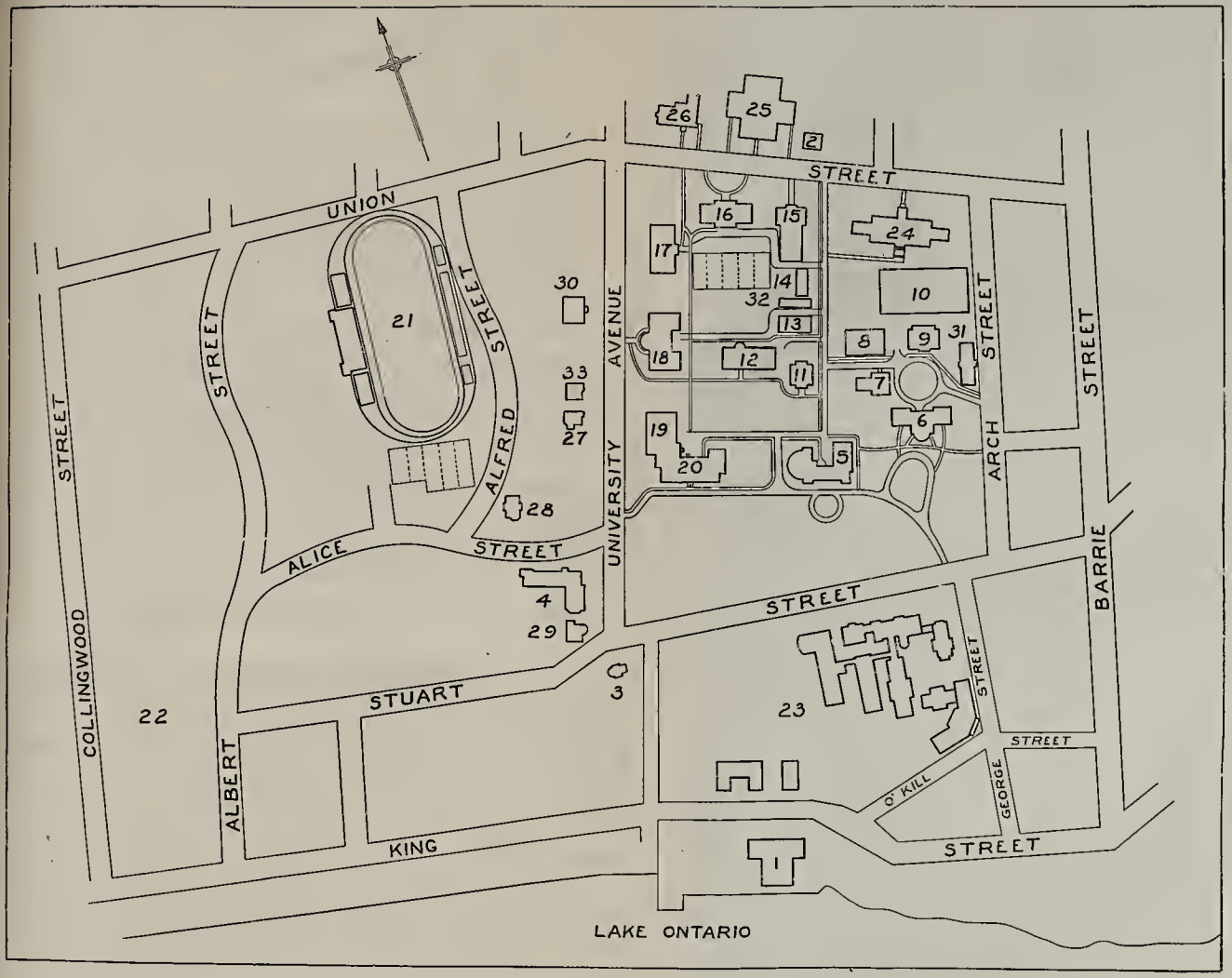
	8 a.m.	9 a.m.	10 a.m.	11 a.m.	1.30 p.m.	2.30 p.m.	3.30 p.m.	4.30 p.m.
Wed.	Geol. V. A.C. Thermo. II. D. Hydraulics II. E.G. Mech. V.(a) F.	Econ. I. A.B.C.D.M. E.F.G. Math. X. H.	Min. III. (a) A (Geol. Opt.) Coll. Chem. II. B. (a) Coll. Chem. I. (a) D. Eng. Rel. E. Thesis E. Mech. VI. F. Elect. IX G. Elect. XII. G.H.	Met. IV. A.M. Min. III. (a) A (Geol. Opt.) Ind. Chem. III. B. (a) Coll. Chem. II. B. (b) Min. V. C Chem. Eng. III D. (a) Chem. Eng. II D. (b) Highway E. Mech. XI. F.(a) Mech. V. F. (b) Elect. V(b) G. Phys. IX. H. (a) Phys. XI. H. (b)	Mining II. A. Phys. Chem. II. B.M. Thesis C. Geol. XII. (a) C (Sect. 1) Thermo. II.(a) D. Struct. IV. E. Elect. VII. F. Hydr. III. (a) G. Elect. VIII. G.H. (b)	Mining II. A. Phys. Chem. II. B.M. Thesis C. Geol. XII (a) C. (Sect. 1) Thermo. II.(a) D. Struct. IV. E. Elect. VII. F. Hydr. III. (a) G. Elect. VIII. G.H. (b)	Phys. Chem. II. B.M. Thesis C. Geol. XII. (a) C. (Sect. 2) Thermo. II.(a) D. Struct. IV. E. Elect. VII. F. Hydr. III. (a) G. Elect. VIII. G.H. (b)	German I. C. Geol. XII. (a) C. (Sect. 2)
Thurs.	Phys. Chem. II. B.D.M.(b) Chem. Eng. II D. (a)	Mech. IV. A.E.G. German II. B.H. Geol. VI. C. Chem. Eng. III. D. Met. V. (b) M. Hydr. II. F.	Hydr. IV. A.D.M. Phys. Chem. III. B. Geol. XII.(a) C. Struct. II. E. Thermo. III. F. Elect. XII. G.H.	Met. IV. A.M. Org. Chem. II. B. Chem. Eng. III. D. (a) Struct. IV. E. Mech. XI. F.(a) Mech. V. F.(b) Elect. V. G. Phys. X. H. (a) Phys. XII. H. (b)	Mining III. A. Min. VI. (a) A. (Geol. opt.) C.M. Geol. VII.(b) A. (Geol. Opt.) Phys.Chem.III. B. Phys. Chem. II. D. Met. Lab. M. (a) Highway E.(a) Mun. and San. II. E.(b) Mun. and San. III. E.(b) Therm. IV (a) F. Hydr. III. (b) F. (Sect. 2) Elect. V. G. Phys. XIII. H	Mining III. A. Geol. VII. (b) A. (Geol. opt.) Min. VI. (a) A. (Geol. Opt.) C.M. Phys.Chem.III. B. Phys. Chem. II. D. Met. Lab. M. Highway E.(a) Mun. and San. II. E.(b) Mun. and San. III. E.(b) Thermo. IV. (a) F. Hydr. III.(b) F. (Sect. 2) Elect. V. G. Phys. XIII. H	Mining III. A Geol. VII. (b) A. (Geol. opt.) Min. VI. (a) A. (Geol. Opt.) C.M. Phys.Chem.III. B. Phys. Chem. II. D. Met. Lab. M. Highway E.(a) Mun. and San. II. E.(b) Mun. and San. III. E.(b) Thermo. IV. (a) F. Hydr. III.(b) F. (Sect. 2) Elect. V. G. Phys. XIII. H.	Geol. VII.(b) A. (Geol. Opt.) Met. Lab. M. (b)

(a)—First term. (b)—Second term.

FOURTH YEAR

	8 a.m.	9 a.m.	10 a.m.	11 a.m.	1.30 p.m.	2.30 p.m.	3.30 p.m.	4.30 p.m.
Fri.	Hydr. IV. (a) A.D.M. Chem. Opt. B. (b) Met. VIII. (a) F.	Geol. II. A (Geol. Opt.) Milling A.M. Chem. Opt. B. (b) German I. C. Chem. Eng. V. D. Hydr. II. E.G. Met. VIII. (a) F. Mech. XI. F. (b) Math. X. H.	Milling A.M. Coll. Chem. II. B. (a) Chem. Opt. B (b) Coll. Chem. I. (a) D. Chem. Eng. IV. D. (b) Struct. IV. E. Mech. X. F. Elect. IX. G. (a) Elect. V. G. (b) Phys. X. H. (a)	Min. II. (b) A. (Geol. opt.) Milling A.M. Ind. Chem. III. B. (a) Coll. Chem. II. B. (b) Min. V. (a) C. Chem. Eng. III. D. (a) Chem. Eng. II. D. (b) Struct. IV. E. Mech. X. F. (a) Mech V.. F. (b) Elect. V. G. (a) Elect. X. (b) G. Phys. IX. H. (a) Phys. XI. H. (b)	Milling A.M. Org. Chem. II. B. Thesis C. Shop Work (b) D. Struct. II. E. Thermo. IV. F. Elect. V. G. Phys. XIII. H.	Milling A.M. Org. Chem. II. B. Thesis C. Shop Work (b) D. Struct. II. E. Thermo. IV. F. Elect. V. G. Phys. XIII. H.	Milling A.M. Org. Chem. II. B. Thesis C. Shop Work (b) D. Struct. II. E. Thermo. IV. F. Elect. V. G. Phys. XIII. H.	Engineering Society
Sat.		Milling A.M. Org. Chem. II. B. Coll. Chem. I. (a) D. Chem. Eng. III. (b) D. Hydr. III. E. (b) Mech. Eng. VIII. F. Elect. IX. G. (a) Elect. XII. G.H.	Min. II. (b) A. (Geol. opt.) Milling A.M. Org. Chem. II. B. Coll. Chem. I. (a) D. Chem. Eng. III. (b) D. Hydr. III. E. (b) Mech. Eng. VIII. F. Elect. IX. G. (a) Elect. XII. G.H.	Min. II. (b) A. (Geol. opt.) Milling A.M. Org. Chem. II. B. Chem. Eng. III. (b) D. Hydr. III. E. (b) Mech. Eng. VIII F. Elect. IX. G. (a) Elect. XII. G.H.				

(a)- First term. (b)—Second term.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PLAN OF QUEEN'S UNIVERSITY GROUNDS

1. Central Heating Plant
2. Commerce Building
3. Observatory
4. Ban Righ Hall
5. Old Arts Building (Theology and Biology)
6. Principal's Residence
7. Old Medical Building
8. Hydraulics Laboratory
9. Medical Laboratory
10. Jock Harty Arena
11. Carruthers Hall (Civil Engineering)
12. Fleming Hall (Mechanical and Electrical Engineering)
13. Technical Supplies and Storehouse
14. Mechanical Laboratory.
15. Nicol Hall (Mining and Metallurgy)
16. Gordon Hall (Chemistry)
17. Douglas Library
18. Ontario Hall (Physics and Chemical Engineering)
19. Grant Hall
20. Kingston Hall (Arts)
21. Richardson Stadium
22. Leonard Field
23. Kingston General Hospital and Richardson Laboratory
24. Miller Hall (Geology and Mineralogy)
25. Gymnasium
26. Students' Memorial Union
27. Gordon House
28. Goodwin House
29. Macdonnell House
30. Muir House
31. Craine Building (Biochemistry and Pharmacology)
32. Gun Shed
33. Matheson House.

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